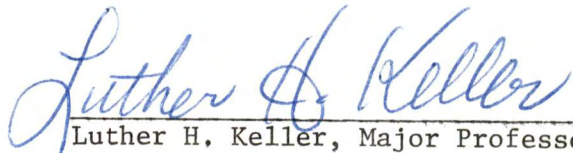


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I am submitting herewith a dissertation written by James Andrew Culver entitled "An Examination of the Impact of the Burley Tobacco Program and the Economic Consequences of Program Changes." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Agricultural Economics.



Luther H. Keller, Major Professor

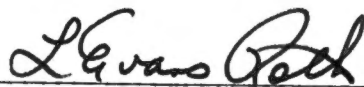
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AN EXAMINATION OF THE IMPACT OF THE BURLEY TOBACCO PROGRAM
AND THE ECONOMIC CONSEQUENCES
OF PROGRAM CHANGES

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

James Andrew Culver

March 1978

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ABSTRACT

The purpose of this study was to provide an economic analysis of the burley tobacco program benefits and possible changes in these benefits and their distribution if burley tobacco quota were allowed to transfer across county lines. The distribution of program benefits were estimated by state, county, income, age, and occupation, both before and after program changes were made.

The study area included 147 Tennessee, Kentucky, and Virginia counties divided into nine regions. Data were obtained from surveys of ASCS county executive directors, 9,000 Tennessee quota owners, and secondary sources.

Quota rental rates were used to estimate both total and average program benefits. The quota demand model was used to estimate the quantitative relationship between quota rental rate and quantity of quota. The quota demand function was then used to estimate the impact of allowing interstate and intrastate transferability of quota.

Considerable direct benefits of the present burley tobacco program accrue to quota owners. These benefits were estimated to be \$144 million for 1974. On the average, quota owner benefits were not particularly large: \$879 for Kentucky, \$259 for Tennessee, and \$263 for Virginia. Even though this income supplement was quite small, its impact may have been quite important because many quota owners had very low incomes. Over half the program benefits in Tennessee went to quota owners with under \$2500 gross farm income in 1974. Almost 90 percent of the Tennessee quota owners received under \$500 in benefits.

The study showed that program benefits would increase substantially if intrastate transfer of quota were allowed and even more so if interstate transfer were allowed. Production distribution would shift as a result of the transfer but the quota lease would compensate producers for this shift. Quota rental rates would rise in quota exporting areas and fall in quota importing areas.

Allowing intrastate or interstate transfer would generate both gains and losses for quota owners, but society as a whole and most quota owners would gain. The study showed that through changes in the lease and transfer provisions of the burley tobacco program, it would be possible to allow movement of burley tobacco production to more efficient production areas while providing some compensation to owners of the quota in exporting areas.

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CHAPTER 1

INTRODUCTION

Farm price and income support programs have been in effect in the United States in some form for about forty years. These programs have been the subject of frequent and often severe criticisms, especially with the demise of the "farm bloc" in Congress. Program criticisms have ranged from high taxpayer costs to the inequality of benefit distribution among income groups and among regions.

An important problem in the debate on agricultural policy often is the general lack of knowledge about the effects of different programs on farm income, government and consumer costs, and their distribution. This analysis is designed to provide additional data to fill part of this void for public decision-making. Generally, in debates over programs, those speculating about the outcomes of various alternatives have little, if any, scientific evidence on which to base decisions. The information that is available, even when perfectly correct, is often suspect simply because it comes from someone with a stake in the outcome of the debate. The purpose of this study is to make an objective evaluation of a specific agricultural policy issue and provide useful information for policymakers.

The underlying need in program analysis is for information on benefits and costs to society of the program in question. Societal costs could include those borne by the taxpayer, community, consumer, and other affected groups. Program benefits follow similar lines accruing to the producer, community, consumer, and society as a whole.

Government Programs in Agriculture

In contrast to the previous twenty years, agricultural income payments and price support costs have been at a low ebb since the enactment of the 1973 Agricultural Act. Under this Act, corn, cotton, and grain sorghum programs all operate under a target price system. Since the target prices were set at levels substantially below market prices prevailing since 1973, the programs have permitted an essentially free market. Rice is the newest commodity addition under the target price system, but it bears the notable provision that target prices are set by law above the average cost of production. Thus, following the 1975 Rice Production Act, there were only two commodity programs, peanuts and tobacco, still operating under the more traditional supply control programs with pressures in both cases for change.

Within the flexibility allowed by the 1973 Agricultural Act, the agricultural programs were operated as nearly like the free market as possible. In addition, proposals were made for changes in the remaining supply control programs toward a more free market orientation. This approach to programs was the result of high agricultural prices as much as political philosophies about agricultural programs. Farmers in general enjoyed "high" prices and great farm program flexibility in the years 1973 through 1976.

Choice of Program for Analysis

Several factors were considered in choosing a program for analysis. First, the tobacco and peanut programs seemed to have the highest likelihood for major changes in the near future. The tobacco program,

especially as it pertains to burley, is very important to Tennessee. The burley tobacco program has a relatively low treasury cost and is considered a minor commodity program. However, it affects a large number of farmers who are very regionalized, thus forming a concentrated political force. The major goal of Congress concerning tobacco has been to maintain stable tobacco prices at a reasonably high level with minimal cost to the Federal treasury. But those Members of Congress from the tobacco growing regions feel the intense political pressures of their tobacco constituents who favor continuing the program but readily exert pressure for needed modifications. Several bills have been introduced to allow cross county transfer of burley quota, and there has been one series of Congressional hearings on the question. The overriding reason for choosing the burley tobacco program for study was the abundant evidence of political and economic pressure for modification of the burley tobacco program, particularly the lease and transfer provisions.

Tobacco Program History

The idea of government programs to control tobacco production is not a twentieth century phenomenon. In fact, in the early 1600's, the Virginia Assembly decreed that only twelve leaves per plant could be harvested in an effort to support the sagging tobacco prices. The impetus for the modern day tobacco control programs grew out of the wide swings in prices and production in the late nineteenth and early twentieth centuries, which caused intense struggles between producers and buyers. The most intense of these struggles was between producers and the American Tobacco Company who, by 1910, had gained an effective monopoly of the market for all tobacco products but cigars.

Agricultural Act of 1933

When Congress began considering the agricultural legislation of 1933, farmers were caught in a serious economic squeeze; tobacco farmers were hurt because export demand for tobacco had been sharply curtailed. Cash receipts from farm marketings of tobacco were down 59 percent from 1929 to 1932 (Grove:1). The various tobacco producer organizations that developed around the turn of the century had maintained enough political influence to have tobacco included in the 1933 Act as a basic commodity. This inclusion provided an opportunity to apply production control and marketing agreement measures for the relief of tobacco growers.

In 1933, producers were asked to sign an agreement to control the size of the 1934 and 1935 crops. With this as inducement, buyers agreed to buy the 1933 crop at a set price, but they were not willing to continue the buying agreement into the next two years. Production control programs had been fully developed and came into operation by the 1934 season which opened above the support price.

Processing taxes were used to provide the revenue for program operation costs. The program was strengthened in 1934 with the passage of the Kerr-Smith Tobacco Marketing Control Act which provided a control mechanism that encouraged producers to sign production contracts and discouraged overplanting by levying a tax of one-fourth of the crop value on uncontracted tobacco (Benedict and Stine:59-60).

The Soil Conservation and Domestic Allotment Act of 1936

A referendum in the summer of 1935 showed that growers strongly supported the program developed under the 1933 Act and the Kerr-Smith

Act. However, a January 6, 1936, Supreme Court ruling repealed the Act and cancelled the programs authorized by it. In 1936, tobacco was defined as a soil depleting crop and goals or allotments were set for each type. Growers were invited to enter into voluntary agreements by which they would continue to adjust production and receive compensatory soil conservation payments. The first Commodity Credit Corporation (CCC) operation in tobacco came in 1936. CCC provided a recourse loan to growers of dark fire-cured tobacco in the 1937 marketing season. The loan was made through the Eastern Dark Fired Tobacco Growers Association and was repaid in full by 1940. In addition, the Federal Surplus Relief Corporation used funds provided under Section 32 of the Act to aid in the export of a small quantity of tobacco and divert a large quantity of tobacco for nicotine insecticides (Benedict and Stine:63-4).

The Agricultural Adjustment Act of 1938

The Soil Conservation and Domestic Allotment Act of 1936 and the Agricultural Adjustment Act of 1938 provided basic objectives for a continuing tobacco program that are still pertinent today. The 1938 Act provided marketing quotas for tobacco rather than acreage allotments. Quotas were proclaimed for the 1938 season and accepted in referendum by producers of tobacco.

For the 1939 season, growers voted down quotas. Freed from controls, plantings increased by one-third to one-half, and prices fell drastically. Farmers reacted by approving quotas again for the 1940 season. Since marketing quotas had not proven very satisfactory, the Act was amended in 1939 to provide for acreage allotments in conjunction with the marketing quotas (Benedict and Stine:65-8).

1940 Through the 1960's

The concept of acreage allotments for burley remained in effect until 1971 as a production control to keep output and stocks at desired levels. For short-term price maintenance, the producer associations, acting as agents for the Commodity Credit Corporation, purchased tobacco stocks at prescribed support levels related to parity prices, thus providing a floor for the tobacco price. The support price for burley tobacco was set at 90 percent of parity but was dropped to 75 percent in later years (Benedict and Stine:65-8).

The burley program also contained a minimum allotment provision so that when national allotment was increased, as occurred during World War II, a portion would go to new producers. However, when allotments were decreased, only those above the minimum allotment level could be decreased. By 1970, more than half of the allotments were at the minimum level, which was one-half acre at the time.

During the 1960's, a substantial decline in total allotted size occurred as production per acre increased. For example, from 1960 to 1970, allotted acreage declined 27 percent in Kentucky and 21 percent in Tennessee, and total burley acres harvested dropped from 295 thousand to 216 thousand.

Pressure for change in the burley and other tobacco programs, as well as many other commodity programs under acreage controls, began to grow during the 1960's. The use of new technology had increased yields rapidly, thus partly negating the effect of acreage controls. Between 1960 and 1970, the yield of burley tobacco increased from an average of over 1600 to over 2500 pounds per acre and total production

climbed from 485 to 560 million pounds despite the nearly 20 percent decline in acreage. By 1970, tobacco stocks were at a 3.37 year supply; a 2.80 year supply was considered adequate. Allotments by 1970 had been reduced to an average of .88 acres, down from an average of 1.05 in 1960.

On the demand side, changes in cigarette manufacturing technology decreased the amount of tobacco needed per cigarette. In addition, late in the 1960's, the smoking health controversy brought about a decline in personal tobacco usage. Cigarette consumption fell on a per capita basis by 2.2 percent in 1968 and continued to fall in 1969 and 1970, bringing about even further reductions in burley demand (Miller:57-79). While this reduction proved to be only temporary, that fact was not at all clear at the time.

Changing Program Direction

Acreage-poundage legislation had been approved by Congress in 1965 for all tobacco, but it was rejected by burley producers in referendum. The Agricultural Act of 1970 discontinued the use of acreage allotments and marketing quotas for wheat, upland cotton, and feed grains. In April 1971, burley producers faced the option of accepting poundage quotas or losing supply control. Growers subsequently approved transformation of acreage allotments into poundage quotas based on the historical yield of each farm.

The 1971 tobacco program provided for the lease and transfer of quotas between growers within a county. The poundage quotas specified that the producer could sell only the amount of tobacco equal to his effective quota regardless of how many acres were used to produce it. Effective quota was calculated as base quota adjusted for carry-over. Carryover included undermarketings of up to one full year of

previous years' base quota less overmarketings of up to 15 percent of previous years' base quota.

With the benefit of carryovers from 1971 through 1974, the effective quota increased by 22.4 percent in Kentucky and by 37 percent in Tennessee. The difference between the movement of actual production and effective quotas reflects a tendency for underplanting and carryover of quotas in the 1970's, which was not possible during the 1960's. Previously, the acreage allotment served as a stimulus for increased production per acre. However, with the change to poundage controls in 1971, along with the provisions for quota carryover, effective quotas began building due to substantial undermarketings.

The program changes made in 1971 yielded important benefits. First, USDA no longer needs to predict yields to set the national allotment or to adjust yields when farms are combined. Second, farmers are able to grow tobacco for leased quotas along with their own quotas and better organize their production.

These program changes were well received by producers as shown by the transfer activity. In 1974, Kentucky producers leased 55 million pounds of quota and Tennessee producers leased 27 million pounds of quota. This amounted to 12 and 21 percent of the base quotas for the respective states.

Recent Situation

In late 1974, industry pressure mounted for additional changes in the tobacco program due to record high prices and the low carryover stock level for both burley and flue-cured tobaccos. This pressure resulted in a 15 percent increase in quotas for 1975. Although the

Administration reportedly favored suspension of quotas, it was not considered politically feasible at that time.

A series of circumstances in 1975 caused the 1974 situation to be exactly reversed. Loss of the Southeast Asian market, along with a decline in world demand due to the world-wide recession, caused burley prices to fall 8 cents per pound and stocks to increase 50 million pounds. Considering inflation, net returns in real terms dropped substantially. The situation for flue-cured tobacco was worse. To counteract this problem 1976 quotas were cut by 15 percent for flue-cured tobacco; however, by law burley quotas could be cut no more than 5 percent annually. Since effective quota had built up from underplanting, the effective cut for burley was only 3 percent, enough to provide some price relief in 1976.

Programs with Indirect Effects

A number of other programs, such as surplus disposal, Public Law 480 exports, CCC short-term export credit, and land retirement, have had a significant impact on farm prices, including tobacco. Of these, the two export assistance programs continue to have a significant effect. One, the Public Law 480 program authorizes export sales of agricultural products for either foreign currencies or long-term and short-term credit dollars at favorable interest rates. The second export assistance program provides short-term export credit for agricultural products. This program has become a major item in the export of U.S. tobacco and has generally provided a stabilizing influence on the tobacco market.

Statement of Problem of Study

Considerable support has developed for a change in the burley program to allow quotas to be transferred across county lines. Several forces have combined to cause this change to be considered: the flexibility and high returns of producers of other commodities, the political popularity of more flexible programs, the economics of resource allocations, and the possibility of mechanization.

Two specific benefits were hypothesized to result from allowing transfer across county lines. First, program changes would decrease the disparity in rental rates between counties. In 1974, quota rental rates ranged from 5 to 40 cents per pound. Second, benefits would accrue from allowing producers to combine quotas for a more efficient size production unit.

The proposed change could take several forms. These include outright sale and transfer of quotas, lease and transfer of quotas, transfer of quota across county lines only, or transfer of quota across county and state lines.

Objectives

The objective of this study was to examine in detail the effects of the proposal to allow quotas to be transferred across county lines, thereby freeing tobacco quotas to move from quota surplus areas to quota deficient areas. In order to complete the analysis of the effects of the proposal in a complete and logical manner, four specific objectives were outlined for this study.

1. Determine the benefits of the present program for the study area.

2. Determine the distribution of burley quota and program benefits in the study area by county and, in the Tennessee counties, by income, age, and occupation groups.
3. Estimate burley quota demand functions for the study area.
4. Predict an equilibrium rental rate and distribution of burley quota and program benefits for the study area with intrastate and interstate transferability of quota based on the estimated quota demand functions.

Study Approach

Program benefits were computed based on average prices producers were paying to lease quota in a particular county. Information available from surveys of quota owners and ASCS county executive directors provided data on quota rental rates and quota owners for determining benefit distribution. The quota demand model was estimated using regression techniques. An equilibrium rental rate and distribution of quota was estimated that would approximately equalize rental rates across county and/or state lines.

Study Area

The burley tobacco belt, as the burley producing area is often called, produces 98.2 percent of all the United States burley. It encompasses portions of six states: Kentucky, Tennessee, Virginia, North Carolina, Ohio, and Indiana. Kentucky and Tennessee are the two largest producers, having 66.7 and 18.5 percent, respectively, of the total production. In Kentucky, the production is concentrated in

the central part of the state, while Tennessee's production is in the middle and eastern areas.

The study area consists of 147 counties in Tennessee, Virginia, and Kentucky as shown in Figure 1. This area, the greater portion of the "burley belt," produced 84.7 percent of the U.S. burley crop in 1974. The original plan was to include all counties with a production concentration of 500,000 or more pounds of quota in 1974. However, four counties producing slightly over the planned 500,000 pound cut-off level were excluded due to their geographical isolation from the rest of the study area.

The study area was subdivided for analysis into nine regions based primarily on agricultural census subregions. Regions were delineated to include areas with similar production and allotment characteristics. Particular attention was given to soil type, production pattern, topography, and farm tenure in determining the regions (Grise, Thompson, and Justus:2-5). The objective was to define homogeneous areas such that a single production function could describe the burley production process with some accuracy.

Region 1 is the Central Basin area of Tennessee. The area is characterized by gently rolling terrain and shallow stony soils that are moderate to high in productivity.

Region 2 is a Silt Loam area and includes counties in both Tennessee and Kentucky. These counties generally have sloping terrain with limestone based soils that are reasonably suited for farming. Most of the soils are silt loams, are usually well drained, and are very productive.

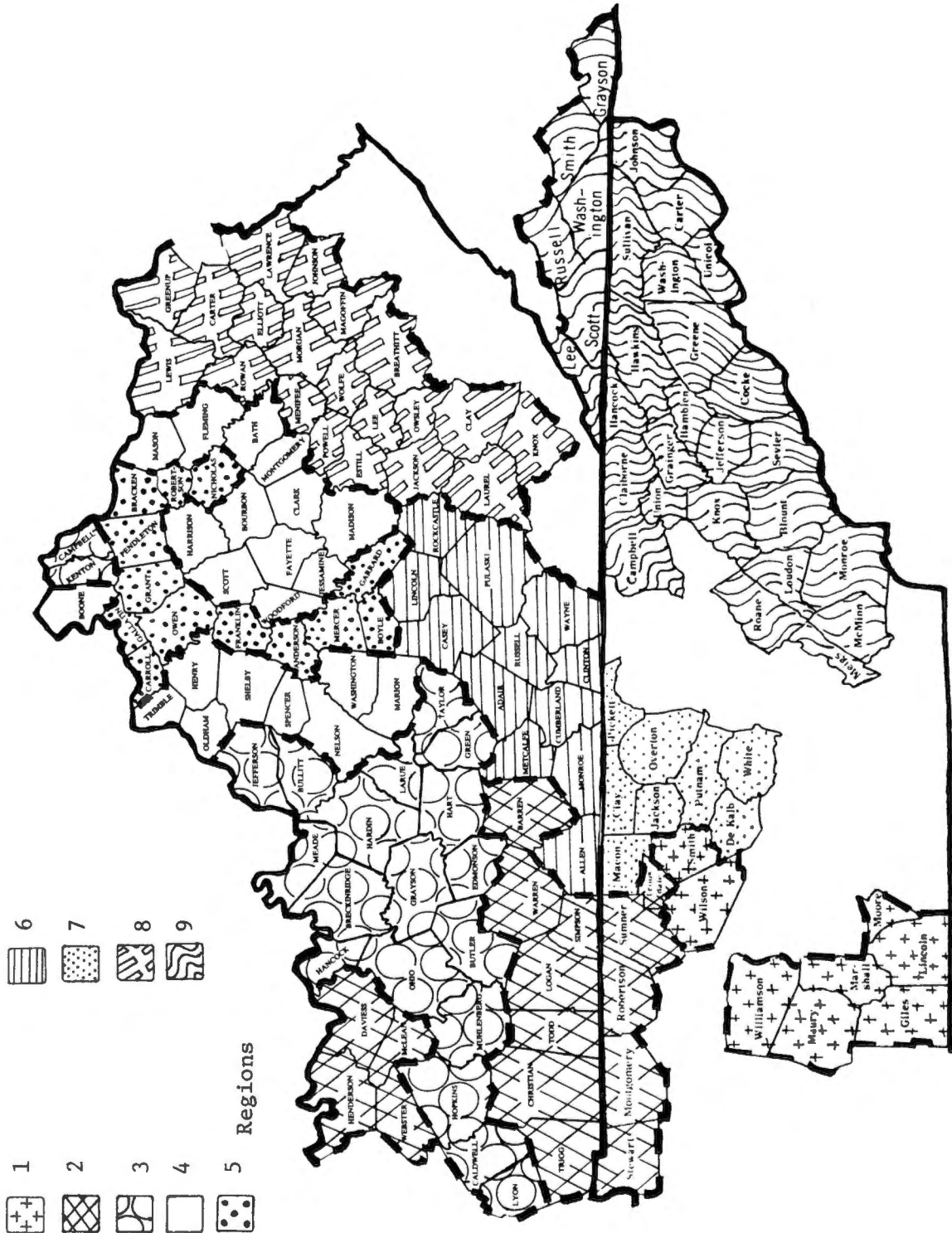


FIGURE 1. STUDY AREA BY COUNTY AND REGION

Region 3 is the Central Kentucky Highlands and is characterized by areas of almost level upland, hilly upland, and considerable bottomland. Wellston and Telsit soils are common. They are usually low in phosphate and moderately acidic. Some of the more level uplands and the bottomlands are poorly drained.

Region 4 contains Kentucky areas generally known as the Inner and Outer Bluegrass. The Inner Bluegrass area is slightly more productive than the Outer Bluegrass and is mainly gently rolling upland. It is well known for its productive soils. The Outer Bluegrass area is a bit more rolling and a little less fertile.

Region 5 is known as the Intermediate Bluegrass. It is a plateau region with narrow winding ridges and valleys. The hillsides are steep and the soils are rocky. Small fields, rugged terrain, and poor soils result in low yields in the area.

Region 6 is the Central Kentucky Plateau area. Limestone and shale soils predominate. They are usually low in phosphate and are somewhat acidic.

Region 7 is the Eastern Rim of the Tennessee Plateau. The area is largely rolling plateau dissected by stream gorges. It is characterized by narrow ridge tops, steep slopes, and narrow valley floors. The soils are a bit rocky, somewhat acid, and are moderate to low in fertility. The soils of the valleys are productive under good management.

Region 8 is Eastern Kentucky. It has a rugged terrain; much of the upland has steep slopes, but many of the ridges have rounded summits. Farming is concentrated on the summits and in the valleys. The land generally responds well to fertilization.

Region 9 is comprised of counties in East Tennessee and Southern Virginia and comprises what is known as the Valley of Eastern Tennessee. The valley is hilly to rolling and the soils are chiefly limestone based with belts of shale and varied rock content. Most of the soils are moderate to low in productivity (Grise, Thompson, and Justus:2-5).

Burley is very much a regional commodity as can be seen from Figure 1 and Table 1. Tennessee and Kentucky account for 85 percent of the production. About 3.6 percent of burley production occurs in Virginia with all other states producing less.

As shown in Table 2, almost one-fourth of the total U.S. burley crop is produced in Region 4, the Inner and Outer Bluegrass areas of Kentucky. Farms tend to be larger in this area, and the average size quota is 5,932 pounds. In 1974, approximately 165 million pounds of burley were produced in the region.

Region 9, the East Tennessee Valley and Virginia counties, produced 14.4 percent of the burley crop, although the average size of both farms and quotas were the smallest of the nine regions. Farms averaged 87.9 acres and quota averaged 1,559 pounds. In 1974, nearly 100 million pounds of burley were produced in Region 9.

Characteristics of Burley Producers and Production

Variations in production practices, yields, size of allotment, and types of farms producing burley cover a wide range. Production practice variations were evident from the 1974 yield spread. The lowest average county yield in the study area was 1400 pounds per acre, and the largest was 2475 pounds per acre. The 233,198 study area quota owners have from one-half acre to twenty acres or more of tobacco. They include small

TABLE 1. BURLEY TOBACCO POUNDAGE QUOTAS BY STATE, 1971-74

State	Year			
	1971	1972	1973	1974
Kentucky	370.0 ¹	396.4	361.2	452.9
Tennessee	102.8	118.0	117.6	141.0
Ohio	17.4	16.6	17.5	24.5
North Carolina	19.6	19.1	20.1	26.8
Virginia	21.3	25.2	24.7	27.2
Indiana	14.4	13.9	14.6	20.0
Other	9.6	9.2	9.7	14.3

¹Poundage quotas in million pounds.

Source: Tobacco Alloted by Counties and by Kinds, USDA, ASCS Tobacco and Peanut Division, 1974.

TABLE 2. PROPORTION OF NATIONAL BURLEY QUOTA AND AVERAGE FARM SIZE FOR NINE REGIONS, 1974

Region	Percent National Burley Quota	Average Farm Size (Acres)	Average Quota Size (Pounds)
Region 1 Central Basin Tennessee	3.1	137.3	1690
Region 2 Silt Loam Area of Tennessee and Kentucky	8.6	138.1	2265
Region 3 Central Kentucky Highlands	8.3	133.2	2384
Region 4 Inner and Outer Bluegrass	23.6	144.3	5932
Region 5 Intermediate Bluegrass	10.5	143.6	5328
Region 6 Central Kentucky Plateau	7.3	107.5	2086
Region 7 Eastern Rim of Plateau, Tennessee	2.5	118.0	1419
Region 8 Eastern Kentucky	6.4	104.7	1898
Region 9 East Tennessee Valley Counties of Tennessee and Virginia	14.4	87.9	1556

Sources: Tobacco Alloted by Counties and by Kinds, USDA, ASCS Tobacco and Peanut Division, 1974; Research Report 8, University of Kentucky, Department of Agricultural Economics, Lexington, 1971.

family farmers, non-farm investors, commercial farmers, part-time farmers with non-farm jobs, and many near subsistence farmers.

In 1974, cash receipts from burley marketings in Kentucky, Tennessee, and Virginia were approximately \$500, \$125, and \$25 million. Burley accounted for 35 percent of the total farm income in Kentucky, 10 percent in Tennessee, and 4 percent in Virginia. In 1974, there were 140,562 quotas in Kentucky with an average effective quota size of 3,222 or about 1.3 acres based on a 2,500 pound per acre yield. Tennessee had 92,693 quotas, but they averaged only 1,521 pounds of effective quota or about .6 acres. Virginia had only 16,861 quotas which averaged 1,550 pounds, also about .6 acres under normal yields.

Not all quota owners produced tobacco after 1971 due to substantial quota combination under the lease and transfer provisions of the burley control program. An estimated 11.6, 18.3, and 20 percent of the quota in Kentucky, Tennessee, and Virginia, respectively, were leased in 1974.

Some counties have more quotas for burley than the number of farms as defined by the U.S. Census Bureau. Many burley producers are small or part-time farmers. As a result, some quota owners do not qualify as farmers according to Census definition. Also, some individuals own more than one tract of land with corresponding separate quotas, but the total of the tracts is considered to be one farm according to Census definition.

On a per acre basis, burley production is more profitable than most other field crops. It meshes with other farm enterprises into a diversified farming operation. The burley enterprise is also well adapted to part-time farming for individuals who have non-farm jobs

or are partly retired. Thus, it has particular significance in many of the very low income mountainous areas in Eastern Tennessee and Eastern Kentucky because of its adaptability to part-time farming and its limited land space requirements.

CHAPTER 2

REVIEW OF LITERATURE

Research dealing with public policy goals has been quite extensive in agricultural economics. The literature relevant to this study is reviewed here in three sections. The first segment deals with overall analysis of the major commodity programs and their welfare aspects. The second and third sections deal with tobacco programs. The literature on tobacco was reviewed to determine what analyses have been made on policy options and what conclusions were drawn. Since the flue-cured tobacco industry and programs are very similar to the burley tobacco industry and programs, the literature on both were examined.

Commodity Programs

The literature on farm programs and policies is rather extensive and contains wide ranging assessments of the programs. Some of the major findings pertinent to this study are summarized here.

Farm policy is generally considered to be a rather poor tool for solving the problems of rural poverty since only one-fourth of the rural population is made up of farmers (Bonnen:461-73). Farm programs are not efficient welfare programs for transferring income to poor farmers (Schultz:25-8).

Farm programs have been designed, whether intentionally or not, to avoid long period of low returns to large farmers (Schultz:25-8). Price support program benefits have been distributed on the basis of the amount of a commodity produced; thus the more commodity produced, the larger the

benefit. The combination of price and income support programs has proved effective, although possibly not efficient, in transferring several billion dollars annually from the nonfarm sector to agriculture. This transfer has helped remove part of the income disparity between farm operators and nonfarm workers (Robinson:1225-34).

Farm programs in general have failed to reduce income distributional inequities within agriculture (Robinson:1225-34). Direct benefits have gone primarily to persons who have relatively large farms, have relatively high current incomes, and have substantial equity in property (Schnitkker:89-90). In the long run, land owners received most of the benefits of the programs (Robinson:1225-34).

Program costs have been borne by consumers and/or taxpayers with many indirect effects. Different programs have different benefits and drawbacks. In many cases, indirect effects have not been readily apparent and thus have not been taken into account in assessing likely program impact.

Flue-Cured Tobacco Programs

In contrast to other commodity programs, costs for tobacco relative to cash receipts from farm marketings of tobacco were significantly lower. For example, in 1970, total direct program costs for tobacco were \$100 million, while cash receipts from farm marketings were \$1.3 billion. In contrast, program costs for wheat were \$1.2 billion, while cash receipts from farm marketings were \$2 billion. In addition, the tobacco program is ultimately more self-financing than wheat since losses on CCC operations are lower for tobacco. Using program costs as a percentage of cash receipts from farm marketings to measure relative

program costs, the percentages for 1970 were 7.7, 60, and 97.7 for tobacco, wheat, and cotton respectively (Bourdeaux and Hourigan:263-5).

Four general conclusions about the tobacco program can be drawn. One, the tobacco program has provided price stability and reduced risk and uncertainty by keeping prices above an equilibrium level but at a relatively low cost to the taxpayers. Two, original allotment owners received windfall gains from the program. These gains were capitalized in allotment (quota) values. Three, the programs have done little to alleviate low returns to the resources used in tobacco production and the benefits of the program have been far below the amount necessary to provide low income farm families a decent level of living. Four, the benefit distribution appeared to be less regressive than most other agricultural commodity programs (Bourdeaux and Hourigan:263-5).

Hartman and Tolley examined the common belief that government controls have resulted in substitution of other inputs for land and that the cost of producing tobacco has therefore been affected. They estimated the results of removing acreage controls and allowing free market prices to apply. Their conclusion was that the main effect of governmental controls on inputs was to increase land prices.

Prices of purchased inputs such as fertilizer and fuels were found to be insensitive to tobacco policy, because such a small portion of total usage of these inputs was affected. Wage rates would be affected by the removal of controls but only in the very short run. For renters, removal of program constraints would result in reductions in both land costs and tobacco prices so that over a number of years, net average income to renters would not likely be greatly affected. They estimated that tobacco prices would be 10-15 cents a pound lower under free market

conditions resulting in at most a penny a pack reduction in the retail price of cigarettes (Hartman and Tolley:5-7).

Paul Johnson estimated the annual welfare gains and losses in operating the flue-cured tobacco program in the 1950's. His analysis viewed the program from society's standpoint rather than from the more traditional producer's standpoint. He estimated net benefits between a \$30 million gain and a \$60 million loss. Benefit estimates were made using a Marshallian analysis of the net social cost triangle with price, quantity, and elasticity. Johnson concluded that during the 1950's, the social cost of operating the flue-cured tobacco program was minimal. Thus, the transfer of income to tobacco producers was not as costly as it might have been expected, mainly due to the gains from the export market based on higher than equilibrium prices (P. Johnson:254-5).

Manning estimated demand and supply equations for inputs of the tobacco industry. From his estimates, he concluded that neither fertilizer demand nor hired labor demand were significantly affected directly by the tobacco support program. Allotment values, however, showed a marked response to changes in tobacco policy variables. An increase of five cents per pound in the support price of tobacco was estimated to increase the value of an acre of allotment by \$200. Manning's study supports the conclusions of other researchers that the tobacco support program has a strong impact on allotment values and thus land values (Manning: 32-9).

Efstratoglou pointed out that before the government tobacco programs were in effect, the distribution of tobacco production among farms and geographical regions was the result of a joint interplay of biological and economic factors. With the development of the acreage

allotment programs, the returns to flue-cured tobacco were substantially increased, but the production pattern was firmly fixed. Consequently, the location of tobacco production has been virtually unaltered over the past 30 years. Since production quotas were not permitted to shift across farms and regions, the usual spatial adjustments in response to changing technological and economic forces were not operative.

Efstratoglou explained that the economic pressures on tobacco farmers to reorganize the geographic and inter-farm distribution of tobacco were partially relieved by the renting of tobacco allotments. Prior to 1962, the only way to obtain an additional allotment was to buy or lease the farm to which an allotment was assigned. In 1962, a lease transfer program was instituted for flue-cured tobacco allotments; however, it was restricted to operation only within counties with no provision for outright sale of allotments.

Since returns to tobacco production vary among counties and within counties due to factors such as land productivity, labor availability, and off-farm job opportunities, so do the rental rates for allotment. Efstratoglou's estimates of equilibrium rental rates after shifts were very close to observed average rates. She hypothesized that if quota were transferable among counties, there would be a tendency for rental rates to equalize and for quota to transfer from low rent counties to high rent counties. The analysis indicated that if a state-wide transfer program were initiated, shifts in income distribution would be substantial, with producers in high-rent counties and owners in low-rent counties gaining and producers in low-rent counties and owners in high-rent counties losing (Efstratoglou:1-2).

Charles Mann's book on tobacco is one of the most all-inclusive recent studies of the structure of the tobacco industry. He drew heavily on existing research work and gave more consideration to flue-cured tobacco than burley since there has been more research in that area.

In analyzing the changes in the tobacco economy, he stressed the changes in the production and marketing of tobacco as mechanization has progressed in flue-cured tobacco. He credits the lease transfer provisions in the flue-cured industry with having paved the way for mechanical harvesters, bulk curing barns, and loose leaf marketing of flue-cured tobacco (Mann:14-26).

Mann used prices of allotment to define program benefits to owners of flue-cured tobacco quota. No such analysis of burley was made since comparable data were not available. He concluded that most of the technical change in burley production had neutral distribution effects, but that this was no longer true for flue-cured tobacco since the advent of the lease and transfer program and the change to poundage quotas in 1962. His work indicates that labor saving technology coming into heavy use in flue-cured tobacco would benefit large producers to the detriment of smaller producers (Mann:33-5).

He suggested that rapid mechanization of flue-cured tobacco production is likely in the very near future. By 1980, he expects approximately 30 percent of flue-cured tobacco to be completely mechanized. The fact that flue-cured allotment can only be transferred within counties, thus restricting allotment size, acts as a barrier against mechanization. Mann anticipated program changes permitting transfers among counties to soon become a reality with a resulting higher percentage of mechanization. Mechanization would obviously displace numerous

share-croppers and tenants. In 1972, one-third of all flue-cured tobacco production units were managed by tenants. In the case of burley, Mann expected less rapid mechanization because the technology for mechanization of burley production still does not exist (Mann:42-4).

Mann points out that political pressure is building for permitting statewide quota transfers in flue-cured tobacco areas and that such pressure makes a change very likely. Pressure for program change is less intense in the burley area, but growing (Mann:67-70).

Mann suggests revisions of the tobacco program so that quotas would be vested with individuals rather than land. This procedure has been used to a limited extent with rice allotments. Provisions for mobility of quotas would increase efficiency of tobacco production, but they would also have some adverse effects on local economies and communities. He argues that compensatory steps could be taken to partially alleviate these adverse impacts, while still allowing a net gain for society from the proposed changes in production control programs (Mann:67-70).

Burley Tobacco Programs

Hoover concluded that management units in burley tobacco areas have been growing progressively smaller relative to the rest of United States agriculture, primarily because of the manner in which the burley allotment program has been operated. He suggested that changes in program rules allowing allotments and quotas to transfer across state and county boundaries would aid farms in growing and obtaining size and locational economies. Less labor would be needed and consolidation would be likely due to retirements of many older operators. Wage earners in

the industry would be affected very little by program changes, but allotment owners, supply industries, and local economies would all be affected by program changes (Hoover:145-6).

Mann identifies the minimum allotment provision in the burley program as a protection device for small allotment holders. During the period of 1943-45, a shortage of burley existed and large number of small new allotments were distributed, rather than increasing the sizes of old allotments. All of the allotments were originally protected from being reduced to less than one acre and finally down to one-half acre. As yields began increasing and surpluses developed, small allotments were protected from cuts, while larger allotments had to bear the reductions. By 1955, 64 percent of all burley allotments were sheltered by the minimum allotment provisions. In 1971, this provision was changed when the burley program was converted to poundage from acreage controls and lease and transfer programs were initiated (Mann:58-61).

Shuffet and Hoskins examined the capitalization of burley tobacco values into land values. A regression analysis of the data indicated an apparent increase in the value of the farm by \$6,015 per acre of allotment. The capitalization of burley allotment values into higher farmland values was attributed to the long-term continuation of the production control price support program and the burley producer's belief that the support program would continue indefinitely (Shuffet and Hoskins:471-4).

The S-42 Committee Cooperative Study has as its objective an estimation of the relation between the price of burley tobacco and the amount of burley and other products produced, the required resources, and the earned incomes if producers maximized profits using advanced

technology in an intermediate run. In one phase of the study, production of burley was assumed to not be limited by acreage allotments. Various assumptions of the levels at which allotments were imposed were made. They found that areas differed dramatically in their responses to burley price and allotment changes. When no allotments were imposed, all areas but one produced several times as much tobacco at the highest price considered as at the lowest price considered. In all but one of the areas, there seemed to be a price level at which tobacco production changed from one of the least profitable to one of the most profitable enterprises; as a consequence, tobacco acreage increased dramatically when the assumed price was increased above this level. This price differed from area to area, but it tended to be higher in Kentucky areas (Southern Cooperative Series Bulletin 162:90).

They concluded that the geographical distribution of burley acreage would change in a free market. Generally, the Kentucky areas would lose importance relative to Tennessee and Virginia areas with the extent of the change depending on the level of burley prices. The Southwest Virginia-East Tennessee area would gain the most at the lowest prices (Southern Cooperative Series Bulletin 162:91).

Grise, Thompson, and Justus examined the enterprise competitiveness of burley tobacco in Kentucky, Tennessee, and Virginia. They focused on the optimum location of burley tobacco production under various prices on allotments. Their work indicated that if burley tobacco allotment were made transferable, in the intermediate run, three regions would become relatively large producers of burley tobacco, while the other six regions would decrease in importance. The three regions which would expand were all in Kentucky, except that four Middle Tennessee counties

were in one of the regions. With decreasing allotments and relative mobility of labor, two of these same three regions increased in importance, again including the one with four Tennessee counties. However, if wages increased, the region that included Upper East Tennessee became one of the most important producers of tobacco. They also concluded that, with free market prices and no allotments, the location of burley production would differ only slightly from the present. In addition, they indicated that shifting acreages among regions would have a major impact on the owners of tobacco warehouses, farm input suppliers, and the general economic conditions of the communities affected (Grise, Thompson, and Justus:35-6).

Clearly, the conclusions of the S-42 Committee and those of Grise, Thompson, and Justus about production shifts with no allotment controls were very different. The major differences hinged on the labor market and tobacco price assumptions in the two studies.

Bradford and Thompson examined the impact of the elimination of the tobacco price support and supply control programs. They considered the impact of returning burley and flue-cured tobaccos to a free market situation. The difference between the price of tobacco and the rental price of allotment was used to approximate the free market price of tobacco in the short run, since allotments had been made negotiable. Bradford and Thompson found that lease rates for flue-cured and burley tobacco approximated 15 and 20 cents per pound respectively, and the prices farmers received approximated 70 and 75 cents per pound. Thus, the short-run supply prices were calculated to be 55 cents per pound. In addition, they concluded that the inputs most likely to be fixed in

the short run for tobacco producers were barn space and resident labor (Bradford and Thompson:271-90).

Quota owner attitudes toward possible program changes were examined by McManus and Keller for Tennessee burley quota owners. Their research showed that in 1975, 54 percent of the quota owners favored transfers within counties, 33 percent favored intrastate transfer, 5 percent favored interstate transfer, and 8 percent wanted no transfer. Concerning program alternatives, 56 percent favored transfer by lease only, 33 percent favored lease or sale, 4 percent favored sale only, and 8 percent wanted no transfer. In addition, one-third of the quota owners felt that the amount of quota transferred to a farm should be limited (McManus and Keller:35-7).

CHAPTER 3

METHODOLOGY AND PROCEDURE

Benefits

The first objective of the study was to determine the benefits of the present burley tobacco program for the study area. The benefits were calculated on a county-by-county basis. The average quota rental rate for the county was multiplied by the amount of quota in the county to get the estimated benefits from the program on a county basis. From these estimates, total estimated program benefits and average estimated benefit per quota owner were identified.

Distribution of Quota and Benefits

The second objective involved determining the distribution of burley quota and program benefits in the study area by county, and in the Tennessee counties, by income, age, and occupation groups.

With the shift of the burley program from acreage to poundage and with intra-county leasing of quota, countywide markets for quota developed. The value per pound of quota in these markets reflected the difference between the tobacco price and the cost of inputs, including risk and uncertainty consideration, but excluding quota. This price of quota represented a measure of the benefit derived from the program by the quota owner. Benefits for each category were determined by multiplying total amount of allotment by average allotment price.

The data for this objective were obtained from a survey of quota owners in the Tennessee portion of the study area and from a survey of

ASCS county executive directors for the total study area. Using the Tennessee data, comparisons were made of the distribution of benefits among the various groupings.

Based on the distribution of benefits of the program, a more complete evaluation of the effectiveness of a program in meeting policy objectives was made. A measure of the distribution of benefits was particularly important from a welfare standpoint.

To obtain income data on the quota owners, a mail survey of the Tennessee portion of the study area (the 44 Tennessee counties) was conducted. The following formula was used to determine the sample size necessary to restrict the sampling error to a prescribed level (Lansing and Morgan:517).

$$N = \frac{4Pq}{L^2}$$

where N = sample size required to attain a given limit of error,

P = proportion of the population expected in smallest group,

q = 1 - P, and

L = allowable error.

The above formula was applied to what was considered the most critical variable, income grouping. The Census income category for classifying farms that had the smallest number included those farms with cash receipts above \$40,000. Six percent of the population in the study area fell into this group. The allowable error was set at ± 5 percent. Solving:

$$N = \frac{4Pq}{L^2} = \frac{4(.06)(.94)}{(.05)^2} = 4048$$

Each county was considered as a separate population since each one represented a separate burley quota market. Since the Tennessee study area included 44 counties, a total sample of 4,048 was needed. Lansing indicated that a response rate of between 25 and 75 percent could be expected, depending on the interest of the respondents in the subject matter (Lansing and Morgan:517). It was assumed that the response rate for this survey would fall in the 40-50 percent range; therefore, 9,000 questionnaires were mailed out. The actual response was 24 percent. The margin for error was ± 7 percent rather than ± 5 percent.

Quota Demand Model

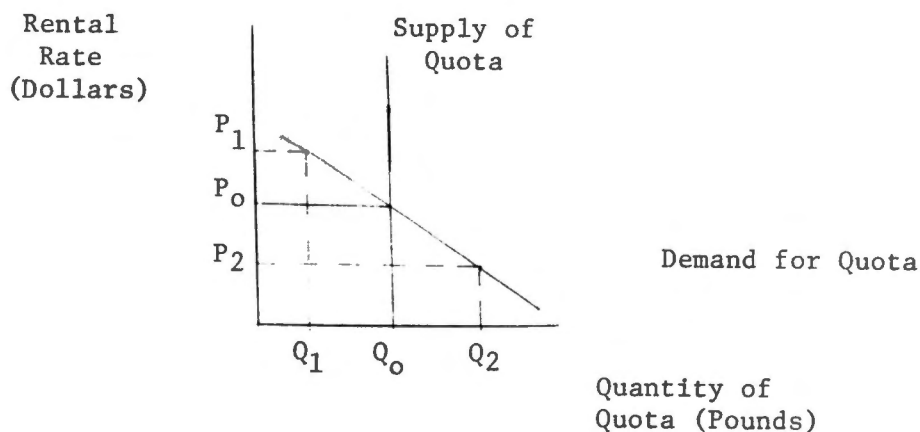
The third objective of this study involved the estimation of burley quota demand functions for the study area. This was needed to estimate the effects of a program change on the benefits of the burley tobacco program. A quota demand model was developed and estimations of the parameters of the model were made using regression analysis.

The objective of the model developed for this study was to describe the market for burley quota. Burley quota was considered as a variable input in the burley production process. As such, the demand for this input followed standard derived demand theory. Henderson and Quandt define producer's demand for an input as being derived from the underlying demand for the commodity which he produced (Henderson and Quandt:69).

If a standard type production function for burley is assumed and producers are assumed to maximize profits, the demand for quota can be

derived from the first order conditions for profit maximization by solving for the particular input in terms of input prices and output (Henderson and Quandt:69). The inputs normally included in the production function are such items as land, labor, capital and machinery, fertilizer and chemicals, and management. A general form of the production function was assumed, $q = f(X_1, X_2 \dots X_N)$, and substitutability among factors was permitted. This production function was assumed to be an average for groups of producers since the unit of observation was the county.

The farmer has two basic choices with respect to his quota. He can produce it or lease it. He starts with a fixed quantity of quota (Q_0) and at every rental rate he demands some quantity of quota which may be more or less than his initial quantity. As illustrated below, above the rental price P_0 , say at P_1 , the farmer would demand less quota (Q_1 rather than Q_0), and below P_0 , at say P_2 , the farmer would demand more quota (Q_2 rather than Q_0). Summing the demand for quota by all farmers in the county yields the total demand for burley quota. The county was the market unit since allotment was transferable only within the county. A model of this type has frequently been used in situations where it was not feasible to divide suppliers and demanders into separate populations.



The supply of quota was perfectly inelastic for each county since there could be no intercounty transfer of quota, thus making the total quantity of quota in the county fixed in a given time period. The rental rate was assumed to be the return to quota, whether it was transferring or not by assuming that leasing and transferring quota was a perfect substitute to the farmer for either producing the tobacco or renting out the quota.

The derived demand for quota could be expected to be a function of the price of burley tobacco and the prices of such inputs as land, labor, machinery, fertilizer, chemicals, and management. In addition, quota price would likely be affected by off-farm job opportunities, amount of quota carry-over from previous years, and county size. Data for the estimation of models used in this study included both cross sectional and time series data from 1971 - 74 for the 147 counties in the study area.

Hypothesized Variables

Quota rental rate. Quota rental rate was the dependent variable used in the quota demand model. Data on the rental rate for each of

the counties were obtained from a survey of county ASCS office managers.

Quantity of quota. The rental rate for quota would logically be expected to vary inversely with the quantity of quota in the county. Each county had two sets of quota data: base quota and effective quota. Base quota was simply the county's share of the national quota base for the year. Effective quota was base quota plus total carryover which included undermarketings minus overmarketings in previous years. Effective quota was used in the estimating models to account for both quantity of base quota and carryover.

Price of tobacco. It was expected that the higher the price for tobacco, the higher the residual rent for quota, other things being equal. Prices were lagged one year since it was assumed that farmers make their decisions on whether or not to rent quota based on recent past prices. Tobacco price data were available by markets rather than by counties. All counties served by the same market were assigned the same average price.

Land. Since the quantity of land used in burley production was very small compared to total land resources, increasing or decreasing the production of tobacco was expected to have little effect on the quality of land available for use in burley production. Therefore, no explicit variable was included in the model to account for land heterogeneity.

Labor. The farm labor market effects on the rental rate for burley were difficult to anticipate. As the wage rate increases, quota rental

rates would be expected to decrease. But the demand for farm labor would be expected to expand if farmers in the county expand production of burley. A shift in the quantity of quota affects the demand for labor and therefore the level of wages, which in turn influences the level of quota rent. There would be two effects of labor on the demand for quota: a direct effect caused by the wage level and an indirect effect. When quota quantity is increased, it not only affects the quota rental rate, but also the demand for labor, and thus the wage, which in turn affects the rental rate for quota.

Thus, the farm labor demand and supply would appear to be simultaneously determined along with the demand for quota. However, producers probably make their decisions about renting quota based on past years experience, indicating that the direct labor effect is not simultaneously determined and farm wages should be a lagged variable.

Because of the indirect effect of the wage level, there was still a question of whether or not labor demand and supply were simultaneously determined. This depended on whether or not the indirect effect was significantly different from zero. Empirical work by both Tyrchniewicz and Efstratoglou for flue-cured tobacco included estimation of models similar to the above hypothesized model where the indirect effects of supply and demand for labor were used. In both cases, the conclusion was drawn that the indirect effects on wage levels were not significantly different from zero (Tyrchniewicz:26; Efstratoglou:68-9).

Given this evidence, it was hypothesized for this study that the demand for burley quota was determined separately from the supply and demand for labor. Indirect effects were assumed to be negligible and were ignored. The labor variable, farm wages, was expected to have a negative relation with quota demand.

Capital. Capital was assumed to be available to farmers in the various counties at basically the same interest rates. The price of capital equipment was also assumed to be constant cross-sectionally. While the cost of capital does vary over time, the variation is generally a reflection of the inflation rate which affects other inputs as well. Therefore, no variable for capital was included in the model.

Management. The management level of farmers in a county was hypothesized to affect the cost of production and the resulting profitability of producing burley. Quota rental rate could be expected to be directly related to the profitability of producing burley. Since it was hypothesized that better managers have higher yields, yield per acre was used as a proxy for management. Yield and rental rate for quota were hypothesized to be positively related.

There was some question about the handling of this variable. Since county data were used, this implied that high yield counties had above average managers. Intuitively, a distribution of good and poor managers in all counties would be expected. Yield also encompasses other factors such as soil and climatic conditions. However, the high-yield counties seem to have better than average managers, at least in terms of producing tobacco, possibly because better quality management was attracted to tobacco production in favorable areas or have acquired superior knowledge through experience.

Off-farm opportunity. The relative profitability of producing burley tobacco depends to some extent on opportunities for off-farm employment. Ideally, some measure of the availability of jobs for

unskilled workers would have been included in the model. Since this type of data was not available, the ratio of total county employment to agricultural employment was used as a proxy variable. Information for this variable was available from Employment Security data. Off-farm opportunity was hypothesized to have a negative effect on quota rental rate. The higher the ratio of total employment to agricultural employment, the lower the quota rental rate was expected to be.

County size. The size of a county was included to account for the relative importance of the quota in a county in comparison to other production alternatives and to account for market size. Total cropland was used as a measure of county size. Data for this variable were available only for census years from the Agricultural Census. Because of this, acres of cropland in 1969 were used as the measure of county size in each time period.

The general quota demand model with farm wages lagged one year was hypothesized as follows:

$$A_c = a + b_1 Q_c + b_2 P_{c,t-1} + b_3 W_{c,t-1} + b_4 OFO_c + b_5 Y_c + b_6 TC_c + T_1 + T_2 + T_3.$$

Table 3 provides definitions of the symbols.

Statistical Considerations

Several statistical and data problems were posed by the proposed models. Those identified were data pooling, multicollinearity, and a lack of complete model specification.

The data used for this study were a combination of cross-sectional and time-series observations. Data for 147 counties and the years 1971-74 were used for a total of 588 observations. When pooled cross-section time-series data were used, the behavior of the disturbance

TABLE 3. DEFINITIONS OF VARIABLES USED IN QUOTA DEMAND AND TRANSFER MODELS

Symbol	Definition
A	Average quota rental rate in cents per pound
R_i	Production region i
Q	Total pounds of effective quota reported in a county (1000 pound units)
Q'_i	$R_i \frac{Q_{c,t}}{Q_d}$, which is the interaction term for region i
P_{t-1}	Price of tobacco in cents per pound, lagged one year
WF_{t-1}	Average farm wage per week in dollars, lagged one year
OFO	Index of off-farm opportunity derived by dividing the total employment by agricultural employment
Y	Burley yield per acre in pounds
TC	Total area of cropland in the county (1000 acre units)
T_t	Year t
b	Coefficient of quota in the quota demand function
c	Subscript that refers to county, $c = 1, 2, \dots, 147$ counties
d	Subscript that refers to base period
e	Subscript that refers to equilibrium level
i	Subscript that refers to production region, $i = 1, 2, \dots, 9$
t	Subscript that refers to year, $t = 1971, 1972, 1973, 1974$

term over the cross-sectional units was likely to be different from a given cross-sectional unit over time. The relationship of two different cross-sectional units at some specific time may differ from the relationship between the disturbances of a specific cross-sectional unit at two different periods of time (Kmenta:508).

A disturbance term of this type may violate both the assumptions of homoscedasticity and nonautocorrelation. Several approaches were available to solve this problem. One was the covariance approach in which each cross-sectional unit and time-series observation could be characterized by its own special intercept. This intercept was incorporated into the regression equation through the use of dummy variables (Kmenta:508-16).

Dummy variables were used in two different ways in this study. First, a set of dummy variables was included to account for the time-series portion of the data. One variable was included for each year except for one year which was deleted for statistical estimation. The second use of dummy variables in the models was to delineate different production regions. The nine regions, as shown in Figure 1, page 13, were the same as those used by Grise, Thompson and Justus as representative areas in their linear programming analysis of the optimum location of burley tobacco production (Grise, Thompson and Justus:2-6). The percentage of the total U.S. burley crop grown and the average farm size of each region were shown in Table 2, page 17. The regions collectively accounted for 84.7 percent of the total U.S. burley production. Zero-one dummy variables were used to account for the time and regional effects, i.e., if an observation fell in a certain region, then the coefficient of the variable was one; otherwise, it was zero.

The approach suggested by Grunfield, which was used here, was based on the idea that the heterogeneity was largely caused by the exclusion or improper specification of variables. Thus, if a model was completely and properly specified, then the economic units would, on the average, react in the same manner to any particular stimulus (Grunfield:399). This approach was used to handle the problem of cross-sectional differences.

Since quota was originally allotted to farmers based on their historical production, counties with a comparative advantage in producing tobacco were allotted more quota and were likely to have the highest rental rates. A positive sloped regression equation could result. To solve this problem, quota was entered into the model as a ratio of the quota for the year in question to the base year, 1970.

Three different statistical models were developed based on differences in handling of the regional dummy variables.

Statistical Model 1

In Model 1, it was assumed that the demand for quota was the same for each region but started at different levels, i.e., each region had a different intercept but the same slope. Variables used in Model 1 are shown below (see Table 3 for definitions):

$$A_{c,t} = a + b_1 \frac{Q_{c,t}}{Q_d} + b_2 P_{c,t-1} + b_3 W_{c,t-1} + b_4 OFO_{c,t} + b_5 Y_{c,t} + b_6 TC_c + b_7 T_2 + b_8 T_3 + b_9 T_4 + b_{10} R_2 + b_{11} R_3 + b_{12} R_4 + b_{13} R_5 + b_{14} R_6 + b_{15} R_7 + b_{16} R_8 + b_{17} R_9.$$

Statistical Model 2

Dummy variables may be used not only as intercept changes, but also

as interaction terms to account for slope differences between regions. In Model 2, the slope as well as the intercept was allowed to vary with regions through the use of interaction terms. According to Sappington, this was statistically equivalent to making no assumption about the slopes or intercepts for each region. With the inclusion of slope change variables, a separate demand equation was derived for each region. The major problem with this approach was the increased likelihood of multicollinearity problems (Sappington:199-200).

The interaction terms (Q') were defined as the product of the regional dummy variable (R_i) and the quantity of quota ($Q_{c,t}/Q_d$), i.e.,
 $Q'_i = R_i \frac{Q_{c,t}}{Q_d}$. Variables used for Model 2 are shown below (see Table 3 for definitions):

$$\begin{aligned} A_{c,t} = & a + b_1 \frac{Q_{c,t}}{Q_d} + b_2 P_{c,t-1} + b_3^{WF} c_{t-1} + b_4^{OFO} c_{t,t} + b_5 Y_{c,t} + b_6^{TC} c + \\ & b_7 T_2 + b_8 T_3 + b_9 T_4 + b_{10} R_2 + b_{11} R_3 + b_{12} R_4 + b_{13} R_5 + b_{14} R_6 + b_{15} R_7 + \\ & b_{16} R_8 + b_{17} R_9 + b_{18} Q'_2 + b_{19} Q'_3 + b_{20} Q'_4 + b_{21} Q'_5 + b_{22} Q'_6 + b_{23} Q'_7 + \\ & b_{24} Q'_8 + b_{25} Q'_9. \end{aligned}$$

Statistical Model 3

As pointed out earlier, the use of the interaction terms increase the probability of multicollinearity problems. The method used in Model 3 to avoid the multicollinearity problem was estimation of the model separately for each region. Variables used for Model 3 are shown below (see Table 3 for definitions):

$$A_{c,t} = a + b_1 \frac{Q_{c,t}}{Q_d} + b_2^P_{c,t-1} + b_3^{WF}_{c,t-1} + b_4^{OFO}_{c,t} + b_5^Y_{c,t} + b_6^{TC}_c + b_7^{T_2} + b_8^{T_3} + b_9^{T_4}.$$

Quota Transfer Model

Objective four involved predicting the equilibrium rental rate and quota distribution with intrastate and interstate transferability of quota. If quota were allowed to transfer between counties and/or states, the market area would be correspondingly expanded. In order to predict a new equilibrium under either type transfer, the assumption must be made that economic processes and market behaviors are unchanged by the expanded transfer rules.

The mechanism for simulating this transfer was adapted from a model used by Efstratoglou to simulate the flue-cured tobacco market. Transferability was alternatively assumed to be either intrastate or interstate. The model predicts the shifts of quota from one county to another due to differences in quota rental rates. Predictions of the equilibrium rental rate were based on the coefficient of quota (b_1) obtained in the quota demand models (Efstratoglou:88-92). The equilibrium rental rate that would prevail in all counties in the defined market with intercounty transfer of quota was A_e and was calculated from the Quota Lease and Transfer Model as follows:

$$A_e - A_c = b_1 \frac{Q_{ec} - Q_c}{Q_{dc}}.$$

The individual county observed quota rental rate was A_c . The b_1 was the coefficient of quantity of quota estimated in the appropriate

quota demand model. It was used to show the relationship between the quota rental rate and amount of quota available. The estimated equilibrium amount of quota with cross county transfer of quota was Q_{ec} . Q_c was the actual amount of effective quota in the county.

The equation involved two unknowns. To solve the equation, the equilibrium rental rate, A_e , was set at an arbitrary level. The equation was then solved for the second unknown Q_{ec} . Then, based on the sum of the solutions of the equation for all counties, the arbitrary A_e was adjusted higher if the sum was negative and lower if the sum was positive. After each iteration, the process moved closer to an equilibrium until an equilibrium rental rate was approximated.

The solution of the above equation was an iterative process and was subject to three constraints:

1. A total quantity constraint required that the sum of all imports must equal the sum of all exports for the market; i.e.,

$$\sum_{c=1}^C (Q_{ec} - Q_c) = 0, \text{ where } c = 147 \text{ counties.}$$

2. A maximum transfer constraint permitted some maximum amount of quota (X) to transfer into a county so that projected production levels were reasonable. $(Q_{ec} - Q_c) \leq X$.
3. A constraint was used to insure quota transferred from a county could not exceed the effective quota of the county. $Q_{ec} \geq 0$.

Most of the data necessary for the study was available in published form. Quota rental rates for each county, however, were obtained from estimates made by ASCS county executive directors.

CHAPTER 4

PROGRAM BENEFITS AND DISTRIBUTION

According to Weisbrod, the welfare aspects of a public program can be divided into two analytically separate questions: is the program economically efficient and are income ditributional effects acceptable (Weisbrod:177). In this study, efficiency was viewed with the free market as a standard of comparison for the burley tobacco program. Equity was viewed in terms of the income distributional effects of the program.

Estimated benefits were restricted to those benefits accruing directly to the burley quota owner. Other possible beneficiaries include the tobacco processing industry, warehousemen, local agribusiness firms, and local economies. The tobacco program also may have enabled some marginal farms to survive as economic units and, in some cases, income from tobacco sales or leases may have been a substitute for welfare payments to families. No attempt was made to estimate these types of benefits in this study. Only the measurable benefits to the quota owner were considered.

It was hypothesized that the quota rental rate in a county represented the difference between the price producers would be willing to produce burley tobacco for in a free market and the actual market price. The difference in these two prices was assumed to be due to the quota restrictions and the market control exercised under the tobacco program. The county rental rate was viewed as the average benefit of quota accruing to owners of quota in a particular county. The differences in

quota rental rates between counties were assumed to result from differences between counties in the variables affecting the quota demand.

All of the benefit calculations were for the 1974 crop year. As an example of the calculation, if a county had an average quota rental rate of 20 cents per pound for a certain year and a total quota allotment of 5 million pounds, the estimated quota owner benefits for that year for that county would be \$1,000,000.

Weisbrod suggested that in evaluating public programs decision makers should consider the comparison of benefit distribution among several groupings of beneficiaries (Weisbrod:185). Grouping used in this study were income, age, occupation, and geographic areas. Income groupings were made based on non-farm and gross farm income. Since a major expressed purpose of the burley program was to increase farm income, income distributional effects were dealt with in some detail.

Distribution of program benefits was determined for the entire study area by state, county, and region, and in Tennessee for age, occupation, farm income, and non-farm income groups. Age, occupation, and income distributions for quota holders were not available for the Kentucky and Virginia portions of the study area.

Geographic Distributions

The estimated program benefits for 1974 are shown in Table 4 for each county and in Table 5 for state, region, total study area, and the United States. Benefits were estimated by multiplying the amount of quota in a county times the average quota rental rate in that county. Effective quota was used in the calculation of program benefits, thus the calculated benefit was the potential benefit for

TABLE 4. ESTIMATED QUOTA OWNER BENEFITS FOR 147 BURLEY BELT COUNTIES, 1974

State	Quota Rental Rate ^a	Average Quota Size ^b	Total Effective Quota ^c	Number Quota Farms	Average Quota Owner Benefits	Total Quota Owner Benefits ^d
County						
<u>Kentucky</u>						
Adair	32	1,754	4,484	2,556	\$ 561	\$1,435
Allen	25	1,774	3,523	1,986	444	881
Anderson	26	3,473	3,872	1,115	903	1,007
Barren	35	3,526	12,078	3,425	1,234	4,227
Bath	30	5,463	6,102	1,117	1,639	1,831
Boone	25	2,278	3,532	1,551	570	883
Bourbon	30	9,345	11,914	1,275	2,804	3,574
Boyle	27	4,358	4,728	1,085	1,177	1,277
Bracken	30	7,136	7,221	1,012	2,141	2,166
Breathitt	18	1,411	1,440	1,021	254	259
Breckinridge	25	3,732	7,703	2,064	933	1,926
Bullitt	15	1,877	1,566	834	282	235
Butler	15	1,216	936	770	182	140
Caldwell	10	1,455	1,304	896	146	130
Campbell	25	1,805	930	515	451	232
Carroll	37	6,818	4,091	600	2,523	1,513
Carter	25	2,023	3,534	1,747	506	883
Casey	25	2,353	5,947	2,527	588	1,487
Christian	20	2,805	6,822	2,432	561	1,364
Clark	25	5,121	7,200	1,406	1,280	1,800
Clay	25	1,901	2,953	1,553	475	738
Clinton	31	1,558	2,326	1,493	483	721
Cumberland	25	2,290	2,612	1,141	573	653
Daviess	30	2,924	7,088	2,424	877	2,126
Edmonson	20	1,857	2,005	1,080	371	401
Elliott	25	2,054	2,293	1,116	514	573
Estill	25	1,922	1,759	915	481	440
Fayette	23	9,055	12,867	1,421	2,083	2,959
Fleming	40	4,462	7,549	1,692	1,785	3,020
Franklin	25	5,393	6,170	1,144	1,348	1,542
Gallatin	32	4,743	2,329	491	1,518	745
Garrard	37	5,674	7,665	1,351	2,099	2,836
Grant	25	4,538	6,953	1,532	1,135	1,738
Grayson	30	2,019	4,510	2,234	606	1,353
Green	35	3,255	5,743	1,764	1,139	2,010
Greenup	25	1,896	2,053	1,083	474	513
Hancock	30	2,797	2,300	822	839	690
Hardin	25	1,951	4,790	2,455	488	1,197
Harrison	27	6,636	10,245	1,544	1,792	2,766

TABLE 4. (Continued)

State						
County	Quota Rental Rate ^a	Average Quota Size ^b	Total Effective Quota ^c	Number Quota Farms	Average Quota Owner Benefits	Total Quota Owner Benefits ^d
Hart	35	4,068	9,080	2,232	\$1,424	\$3,178
Henderson	15	1,669	1,182	708	250	177
Henry	35	7,077	10,098	1,427	2,477	3,534
Hopkins	13	1,428	580	406	1,186	75
Jackson	30	1,906	3,176	1,666	572	953
Jefferson	18	2,043	907	444	368	163
Jessamine	25	5,569	7,212	1,295	1,392	1,803
Johnson	15	1,350	977	724	203	147
Kenton	23	1,886	1,731	918	434	398
Knox	21	1,291	1,265	980	271	266
Larue	35	2,467	3,412	1,383	863	1,194
Laurel	27	1,668	4,719	2,830	450	1,274
Lawrence	15	1,268	943	744	190	141
Lee	25	1,158	709	612	290	177
Lewis	30	3,560	5,116	1,437	1,068	1,535
Lincoln	30	2,745	6,639	2,419	824	1,992
Logan	25	1,784	3,854	2,160	446	964
Lyon	15	1,429	513	359	214	77
McLean	25	1,497	1,542	1,030	374	385
Madison	30	5,456	11,442	2,097	1,637	3,432
Magoffin	22	1,393	1,920	1,378	306	422
Marion	35	3,959	5,467	1,381	1,386	1,914
Mason	25	8,036	9,378	1,167	2,009	2,345
Meade	25	1,656	1,879	1,135	414	470
Menifee	30	2,131	1,537	721	639	461
Mercer	25	4,705	7,443	1,582	1,176	1,861
Metcalfe	30	3,486	5,451	1,564	1,046	1,635
Monroe	32	2,052	3,742	1,823	657	1,197
Montgomery	29	5,415	6,535	1,207	1,570	1,895
Morgan	26	2,391	4,141	1,732	622	1,077
Muhlenberg	12	1,525	1,200	787	183	144
Nelson	30	3,068	4,777	1,557	920	1,433
Nicholas	30	6,701	5,896	880	2,010	1,769
Ohio	22	1,592	2,995	1,881	350	659
Oldham	17	3,370	1,924	571	573	327
Owen	29	6,663	8,749	1,313	1,932	2,537
Owsley	25	1,663	1,924	1,157	416	481
Pendleton	21	4,549	6,159	1,354	955	1,293
Powell	25	1,876	1,165	621	469	291
Pulaski	30	1,786	7,172	4,015	536	2,152
Robertson	25	6,298	2,765	439	1,575	691

TABLE 4. (Continued)

State						
County	Quota Rental Rate ^a	Average Quota Size ^b	Total Effective Quota ^c	Number Quota Farms	Average Quota Owner Benefits	Total Quota Owner Benefits ^d
Rockcastle	35	2,292	3,353	1,463	\$ 802	\$1,174
Rowan	28	1,781	1,658	931	499	464
Russell	25	1,732	3,492	2,016	433	873
Scott	25	8,116	11,240	1,385	2,029	2,810
Shelby	30	6,397	12,647	1,977	1,919	3,794
Simpson	23	1,923	2,288	1,190	442	526
Spencer	32	5,581	2,549	815	1,786	1,456
Taylor	35	2,780	4,913	1,767	973	1,720
Todd	20	2,276	2,925	1,285	455	585
Trigg	22	2,169	1,865	860	477	410
Trimble	30	5,612	4,254	758	1,684	1,276
Warren	25	2,146	6,583	3,068	537	1,646
Washington	35	4,745	7,080	1,492	1,661	2,478
Wayne	30	1,675	3,117	1,861	503	935
Webster	12	1,428	467	327	171	56
Wolfe	25	2,215	2,122	958	554	530
Woodford	25	10,920	10,854	994	2,730	2,714
<u>Tennessee</u>						
Blount	2	1,446	2,343	1,620	29	47
Campbell	10	1,471	1,246	847	147	125
Carter	10	1,387	2,858	2,061	139	286
Claiborne	25	1,702	5,535	3,253	426	1,384
Clay	21	1,478	1,534	1,038	310	322
Cocke	13	1,558	3,796	2,437	203	493
DeKalb	10	1,409	2,295	1,629	141	230
Giles	10	1,311	1,353	1,032	131	135
Grainger	17	1,558	3,366	2,160	265	572
Greene	20	1,821	10,750	5,902	364	2,150
Hamblen	18	1,521	2,524	1,659	274	454
Hancock	25	1,708	2,757	1,608	427	687
Hawkins	20	1,529	5,986	3,916	306	1,197
Jackson	15	1,433	2,390	1,668	215	358
Jefferson	18	1,443	3,323	2,303	260	598
Johnson	15	1,447	2,901	2,005	217	435
Knox	10	1,356	2,334	1,722	136	233
Lincoln	9	1,341	1,857	1,385	121	167
Loudon	8	1,430	2,106	1,473	114	168
McMinn	5	1,353	2,748	2,031	68	137
Macon	25	1,981	4,277	2,159	495	1,069
Marshall	10	1,325	1,635	1,234	133	164
Maury	13	1,812	5,012	2,766	236	652
Meigs	5	1,182	746	631	59	37

TABLE 4. (Continued)

State						
County	Quota Rental Rate ^a	Average Quota Size ^b	Total Effective Quota ^c	Number Quota Farms	Average Quota Owner Benefits	Total Quota Owner Benefits ^d
Monroe	7	1,350	2,992	2,216	\$ 95	\$ 209
Montgomery	22	1,591	2,589	1,627	350	570
Moore	6	1,565	972	621	94	58
Overton	15	1,095	1,191	1,088	164	179
Pickett	20	1,182	1,026	867	236	205
Putnam	10	1,280	2,712	2,119	128	271
Roane	4	1,346	1,127	837	54	45
Robertson	25	1,283	2,652	2,067	321	663
Sevier	5	1,526	4,288	2,811	76	214
Smith	20	2,432	4,310	1,772	486	862
Stewart	15	1,163	715	615	174	107
Sullivan	11	1,512	4,453	2,945	166	490
Sumner	20	1,982	6,055	3,055	396	1,211
Trousdale	21	3,516	2,229	634	738	468
Unicoi	15	1,480	1,250	845	222	188
Union	18	1,454	2,017	1,387	262	363
Washington	18	1,532	5,706	3,725	276	1,027
White	10	1,174	2,077	1,769	117	208
Williamson	10	2,028	3,910	1,928	203	391
Wilson	10	1,289	2,901	2,250	129	290
Virginia						
Grayson	12	1,223	1,011	827	147	121
Lee	20	1,628	5,019	3,083	326	1,004
Russell	25	1,741	3,634	2,087	435	908
Scott	20	1,565	5,796	3,703	313	1,159
Smyth	20	1,476	2,043	1,384	295	409
Washington	25	1,820	7,143	3,925	455	1,786

^aQuota rental rate in cents per pound.

^bAverage quota size in pounds.

^cTotal effective quota in thousand pounds.

^dTotal quota owner benefits in thousand dollars.

TABLE 5. ESTIMATED QUOTA OWNER BENEFITS BY REGION, STATE, STUDY AREA, AND UNITED STATES, 1974

Area	Quota Rental Rate (Cents/Pound)	Average Quota Size (Pounds)	Total Quota Size (1000 Pounds)	Percent of U.S. Quota	Number of Farms	Percent of U.S. Farms	Quota Owner Benefits ^a (Weighted by Region)	Percent of U.S. Benefits	Average Quota Owner Benefits
Region 1	15	1,690	21,950	3.10	12,988	4.41	\$ 3,293 ^K	1.94	\$ 254
			46,693 ^K		18,909 ^K		10,739 ^K		
			14,240 ^T		7,998 ^T		3,275 ^T		
Region 2	23	2,265	60,933	8.62	26,907	9.13	14,015	8.26	521
Region 3	23	2,384	58,997	8.35	24,746	8.40	13,569	8.00	548
Region 4	28	5,932	166,869	23.61	28,129	9.55	46,723	27.53	1,661
Region 5	28	5,328	74,042	10.47	13,898	4.72	20,732	12.22	1,492
Region 6	30	2,086	51,857	7.34	24,864	8.44	15,557	9.17	626
Region 7	16	1,419	17,502	2.48	12,337	4.19	2,800	1.65	227
Region 8	24	1,898	45,402	6.42	23,926	8.12	10,896 ^T	6.42	456
			77,143 ^T		50,394 ^T		12,343 ^T		
			24,647 ^V		15,009 ^V		3,944 ^V		
Region 9	16	1,556	101,790	14.40	65,403	22.19	16,286	9.60	249
Kentucky	26	3,301	443,860	62.80	134,472	45.64	118,217	69.67	879
Tennessee	14	1,563	130,835	18.51	83,717	28.42	21,711	12.80	259
Virginia	20	1,642	24,647	3.49	15,009	5.09	3,944	2.32	263
Study Area	22	2,399	599,342	84.79	233,198	79.15	143,872	84.79	617
United States	22*	2,399	706,827*	100.00	294,627	100.00	169,680*	100.00	576
^KKentucky Portion ^TTennessee Portion ^VVirginia Portion *Projected									

^aTotal quota owner benefits in thousand dollars.

1974. Effective quota is the base quota less overmarketings from past years plus undermarketings. Since undermarketings exceeded overmarketings, this formula would tend to overestimate the flow of benefits over time. In Tennessee, for example, effective quota was 25 percent greater than base quota for 1974. The difference between effective quota and base quota is the unused portion of the base quota accumulated from past years and represents unrealized benefits from past years. While actual flow of producer benefits was probably smaller than the estimated benefits reported here, relative benefits would be similar regardless of which quota measure was used. The projected benefit for the United States was obtained by dividing the total benefits for the study area by .85, the portion of the total quota represented by the study area.¹

As shown in Table 4, the largest benefits per county, \$4.2 million, were found in Barren County, Kentucky, in Region 2. Barren County had both a high average quota rental rate and a large quantity of effective quota. While Barren County produced only 1.70 percent of the burley crop in 1974, it received 2.59 percent of the total benefits of the program.

The highest average benefit per quota owner, \$2,804 in 1974, was found in Bourbon County, Kentucky. The average quota size for Bourbon County was 9,345 pounds, compared to the national average quota size of 2,399 pounds. Bourbon County's quota rental rate was 30 cents per pound compared with a study area average of only 22 cents per pound in 1974.

¹This estimate was likely to be somewhat overstated since areas omitted by the study were fringe areas having lower average quota rental rates.

The highest total benefit of any county in Tennessee was Greene County with an estimated program benefit of \$2.15 million, approximately half that of Barren County, Kentucky. The highest total benefit of any county in Virginia was \$1.79 million for Washington County.

Ten of the 97 Kentucky counties had average quota owner benefits of \$2,000 or more in 1974. These counties had generally larger than average quota sizes and above 30 cents per pound average quota rental rates. In Tennessee, Macon County had the highest county average quota benefit of \$495. In Virginia, the highest average quota owner benefit was \$455 in Washington County. Only 32 of 97 counties in Kentucky had average quota owner benefits of less than \$495 and of these 25 were less than \$455. In Kentucky, ten counties had average quota rental rates of more than 30 cents per pound in 1974; in Tennessee, only four counties had quota rental rates as high as 25 cents per pound. Quota rental rates were between 20 and 25 cents in eight additional Tennessee counties. Virginia had two counties with quota rental rates of 25 cents and three counties with average rental rates of 20 cents.

The distribution of the benefits between the regions and states is shown in Table 5. Average effective quota size was 3,301 pounds in Kentucky, 1,563 pounds in Tennessee, and 1,642 pounds in Virginia. In 1974, the Kentucky study area had 62.8 percent of the quota and received an estimated 69.7 percent of the benefits.¹ The Tennessee study area with 18.5 percent of the quota received only 12.8 percent of the benefits. The six Virginia counties, with 3.5 percent of the quota,

¹This estimate of Kentucky's portion of the program in benefits could be slightly low due to the method of calculating total U.S. benefits.

received 2.3 percent of the benefits. Since benefits were determined on the basis of quota rental rates, disproportionalities were the result of variations in quota rental rates. The mean quota rental rate for the study area in 1974 was 22 cents per pound, compared to 26 cents for Kentucky, 14 cents for Tennessee, and 20 cents for Virginia.

Nationally, the quota was apportioned among 294,627 quota owners. Slightly less than 46 percent of the quota owners were in Kentucky, but these Kentucky quota owners received nearly 70 percent of the benefits. On the other hand, 28.4 percent of the quota owners were in the Tennessee study area, but they received only 12.8 percent of the benefits. Virginia had 5.1 percent of the quota owners and received only 2.3 percent of the benefits. The average quota benefit in Kentucky in 1974 was almost three and one-half times as high as those of Tennessee and Virginia, \$879 compared to \$259 and \$262. The difference was due to both larger quotas and higher rental rates in Kentucky.

Among the nine regions, total and average benefits per quota owner were highest in Region 4, the Inner and Outer Bluegrass area; second highest was Region 5, the Intermediate Bluegrass area. Total benefits were \$46.7 million in Region 4 and \$20.7 million in Region 5. The average quota sizes were 5,932 and 5,328 pounds for these two regions. Quota rental rates averaged 28 cents in both Regions 4 and 5, but almost 30 cents in Region 6, the Central Kentucky Plateau. Average benefit per quota owner was \$1,661 in Region 4 and \$1,492 in Region 5. Despite the higher quota rental rate in Region 6 (30 cents), average benefit per quota owner was only \$626 since average quota was substantially lower than in Regions 4 and 5.

Benefits tended to be geographically concentrated in Kentucky, especially in Regions 4 and 5, where 34 percent of the U.S. burley crop is grown. Average benefits per quota owner were more than twice as high in Regions 4 and 5 than any other region. The average quota owner benefits were seven times as high in Region 4, the Inner and Outer Bluegrass Area, as in Region 7, the Tennessee Plateau Rim. Average benefits per quota owner in Tennessee and Virginia regions tended to be about half the level of the lowest Kentucky regions.

Quota Benefits and Their Distribution in Tennessee

A more detailed analysis of quota benefits was done for the Tennessee portion of the study area. Results of this analysis would not be applicable to the Kentucky portion of the study area because of wide differences between Kentucky and Tennessee in average quota size and rental rate. Characteristics of Tennessee quota owners with respect to age, occupation, farm income, and non-farm income were obtained from a mail survey of a sample of Tennessee quota owners. These were examined extensively in order to give a perspective to the distribution of quota benefits.¹

Profile of Tennessee Quota Owners

The average age of a burley tobacco owner in the Tennessee study area was 56 years. The age distribution of the quota owners was as follows: 9 percent were 35 or under; 27 percent were 36-50; 39 percent were 51-65; and 25 percent were over 65 as shown in Tables 6 and

¹In addition to the condensed tables in this chapter, tables with more detailed comparisons are included in the Appendix, Tables A-1 through A-9.

TABLE 6. DISTRIBUTION OF BENEFIT GROUPS OF BURLEY TOBACCO QUOTA OWNERS BY AGE FOR 44 SELECTED TENNESSEE COUNTIES, 1974

Benefit Categories	Age Categories		Row Total Row Percent
	50 and Under	51 and Over	
\$0 - \$500	Count	1249	1954
	Row Percent	36.1	63.9
	Column Percent	90.3	89.3
	Total Percent	32.3	57.3
\$501 - \$1000	Count	106	163
	Row Percent	35.0	65.0
	Column Percent	7.3	7.6
	Total Percent	2.6	4.9
\$1001 and Over	Count	44	63
	Row Percent	30.2	69.8
	Column Percent	2.4	3.1
	Total Percent	0.9	2.0
Column Total		1399	2180
Column Percent		35.8	64.2

^a A more detailed distribution is shown in Table A-6.

A-1. Almost two-thirds (64 percent) of the quota owners were over 50 years of age.

Burley tobacco quota owners in Tennessee generally had rather low gross farm income measured in terms of cash receipts from farming. As shown in Table A-1, 63 percent of the quota owners had gross farm incomes less than \$2,500. Only 10 percent of the quota owners had gross farm incomes of \$10,000 or more. The balance, 28 percent, had gross farm incomes ranging from \$2,500 to \$10,000.

The quota owners with less than \$2,500 gross farm income also generally had a relatively small non-farm income. As shown in Table A-2, 9 percent of the quota owners who had gross farm income of less than \$2,500 per year reported no non-farm income and another 19 percent had non-farm incomes of less than \$2,500. A total of 43 percent of the quota owners had \$2,500 or less gross farm income and non-farm incomes of less than \$5,000 per year. The government poverty level standard for farm families was \$4,302 for 1974. Not all of the quota owners had low incomes, however. Of the quota owners studied, 23 percent had non-farm incomes of more than \$10,000 in 1974. Almost 10 percent of the quota owners had gross farm incomes of more than \$10,000.

Non-farm income was fairly evenly distributed between the categories other than the under \$2,500 category where there was a concentration of 44 percent of the quota owners. The distribution of gross farm income was much less even with almost 80 percent of the quota owners having gross farm incomes of less than \$5,000.

The above income relationships can be better understood in the context of the occupational characteristics of the quota owners in

the study. Only 28 percent of the quota owners surveyed considered themselves as full-time farmers as shown in Table A-3. The largest group, 41 percent, considered themselves as part-time farmers. The smallest of the occupation groupings was full-time non-farmers with 10 percent. Another 20 percent of the quota owners listed their occupational category as other. A large portion of these quota owners was likely to be retired.

Full-time farmers generally had higher gross farm incomes than other occupation groups as shown in Table A-3. This same group was also the most likely occupational group to have zero non-farm income (44 percent) and the least likely to have non-farm income of \$10,000 per year or more (1 percent) as shown in Table A-4.

Quota owners over 65 years of age were most likely to have gross farm incomes of less than \$2,500 (75 percent) and zero non-farm income (27 percent). This same group was the least likely to have gross farm incomes of \$40,000 or more (2 percent) and non-farm incomes of \$15,000 or more (4 percent). From a non-farm income standpoint, those aged 50 or under tended to have higher percentages in the higher income categories than either the 51-65 group or the over 65 group.

Distribution of Quota Owner Benefits

As shown in Table 6, 89.6 percent of the quota owners in the study had benefits of \$500 or less from the burley tobacco program. About 8 percent received benefits of between \$500 and \$1,000 and 3 percent received benefits of over \$1,000. Numerically only 61 quota owners, out of a total sample of 2,020, had benefits of \$1,000 or more and only 156 had benefits between \$500 and \$1,000. The majority, 1,803,

had benefits of \$500 or less. This was consistent with earlier estimates of quota owner benefits by county, where the largest average quota owner benefit for any county in Tennessee was only \$495. A more detailed distribution of benefits to Tennessee quota owners is shown in Table A-6.

Comparison of Program Benefit Distribution with Age Distribution

As shown in Table 6, the benefits were distributed similarly between the two age groups, 50 and under compared to 51 and over. Quota owners 50 or under made up 36 percent of the sample of quota owners. Ninety percent of this group received benefits of \$500 per year or less. The over 50 age group made up 64 percent of the sample of burley quota owners, and 89 percent of this group received benefits of \$500 or less.

Comparison of Program Benefit Distribution with Occupational Distribution

Part-time farmers were the largest of the occupation grouping, constituting 41 percent of the quota owners surveyed as shown in Table 7. About 93 percent of the part-time farmer group had benefits of \$500 or less, 5 percent had benefits between \$500 and \$1,000, and 2 percent had benefits of over \$1,000. About 28 percent of the quota owners sampled were classified as full-time farmers. Program benefits were generally somewhat higher than for the part-time farmer group: 82 percent had benefits of \$500 or less; 13 percent had benefits of \$500 to \$1,000; 5 percent had benefits of \$1,000 and over. Full-time non-farmers, on the other hand, the smallest of the sample groups

TABLE 7. DISTRIBUTION OF BENEFIT GROUPS OF BURLEY TOBACCO QUOTA OWNERS BY OCCUPATION FOR 44 SELECTED TENNESSEE COUNTIES, 1974^a

Benefit Categories	Occupational Categories				Row Total Row Percent
	Full-Time Farmer	Part-Time Farmer	Full-Time Non-Farm	All Other	
\$0 - \$500	Count	811	214	409	1926
	Row Percent	42.1	11.1	21.2	
	Column Percent	93.1	93.5	91.1	
	Total Percent	37.7	9.9	19.0	89.5
\$501 - \$1000	Count	41	11	29	162
	Row Percent	25.3	6.8	17.9	
	Column Percent	4.7	4.8	6.5	
	Total Percent	1.9	0.5	1.3	7.5
\$1001 and Over	Count	19	4	11	64
	Row Percent	29.7	6.3	17.2	
	Column Percent	2.2	1.7	2.4	
	Total Percent	0.9	0.2	0.5	3.0
Column Total		871	229	449	2152
Column Percent		40.5	10.6	20.9	

^a A more detailed distribution is shown in Table A-7.

comprising only one-tenth of the sample, received less than a proportionate share of the benefits.

Comparison of Program Benefit Distribution with Gross Farm Income Distribution

The distribution of program benefits among gross farm income categories is shown in Table 8. Quota owners who received program benefits of \$500 or less and had gross farm income of \$2,500 or less made up 61 percent of the total. Just over one percent of the quota owners received benefits of over \$1,000 and had gross farm income of \$10,000 or more.

As shown, most Tennessee burley quota owners included in the survey did not have large farm incomes in 1974; only 10 percent had gross farm incomes of \$10,000 or more. It can be inferred from Table 8 that a sizable group of the quota owners received most or all of their gross farm income from tobacco. Gross income from tobacco would have been approximately six to seven times the quota benefit on the average. The benefits of the program were, therefore, clearly an important part of farm income considering the relatively low gross farm income of many quota owners in this study.

Comparison of Program Benefit Distribution with Non-Farm Income Distribution

The comparison of program benefits and non-farm income was quite different from the comparison of program benefits and gross farm income. Quota benefits were much more evenly distributed among non-farm income groups. As shown in Table 9, 627 of the quota owners in the sample had non-farm incomes of \$7,500 or more and 563 of these received benefits of \$500 or less. The amount of non-farm income seemed to have little

TABLE 8. DISTRIBUTION OF BENEFIT GROUPS OF BURLEY TOBACCO QUOTA OWNERS BY GROSS FARM INCOME FOR 44
SELECTED TENNESSEE COUNTIES, 1974^a

Benefit Categories	Gross Farm Income Categories				Row Total Row Percent
	Under \$2500	\$2500- \$9999	Over \$9999		
\$ 0 - \$500	Count	1225	454	124	1803
	Row Percent	67.9	25.2	6.9	
	Column Percent	96.4	81.5	64.6	
	Total Percent	60.6	22.5	6.2	89.3
\$501 - \$1000	Count	42	75	39	156
	Row Percent	26.9	48.1	25.0	
	Column Percent	3.3	13.5	20.3	
	Total Percent	2.1	3.7	1.9	7.7
\$1001 and Over	Count	4	28	29	61
	Row Percent	6.6	45.9	47.5	
	Column Percent	0.3	5.0	15.1	
	Total Percent	0.2	1.4	1.4	3.0
Column Total		1271	557	192	2020
Column Percent		62.9	27.6	9.5	

^aA more detailed distribution is shown in Table A-8.

TABLE 9. DISTRIBUTION OF BENEFIT GROUPS OF BURLEY TOBACCO QUOTA OWNERS BY NONFARM INCOME FOR 44 SELECTED TENNESSEE COUNTIES, 1974^a

Benefit Categories	Nonfarm Income Categories					Row Total Row Percent
	None	Under \$2500	\$2500-\$7499	Over \$7499		
\$0 - \$500	Count	304	454	418	563	1739
	Row Percent	17.5	26.1	24.0	32.4	
	Column Percent	85.2	89.4	91.7	89.8	
	Total Percent	15.6	23.3	21.5	28.9	89.3
\$501 - \$1000	Count	39	43	26	39	147
	Row Percent	26.5	29.3	17.7	26.5	
	Column Percent	10.9	8.5	5.7	6.2	
	Total Percent	2.0	2.2	1.3	2.0	7.5
\$1001 and Over	Count	14	11	12	25	62
	Row Percent	22.6	17.7	19.4	40.3	
	Column Percent	3.9	2.1	2.6	4.0	
	Total Percent	0.7	0.6	0.6	1.3	3.2
Column Total		357	508	456	627	1948
Column Percent		18.3	26.1	23.4	32.2	

^aA more detailed distribution is shown in Table A-9.

relationship to quota benefits received. All of the following received less than \$500 in benefits: 85 percent of the quota owners with zero non-farm income, 89 percent of those with non-farm income of \$2,500 or less, 92 percent of those with non-farm income between \$2,500 and \$7,500, and 90 percent of those with non-farm income of \$7,500 or more.

Point Estimates of Program Benefits

Data in Tables 6 through 9 do not show the percentage of benefits attributable to gross farm income, non-farm income, age, or occupation groups, but rather the percentage observations in each of these sub-groups. A rough approximation of the incidence of benefits to various groups was obtained by using the mid-point of each of the groups to represent the average for the group. Total benefits were obtained by multiplying the number of observations times the mid-point and summing over each of the groups to obtain estimated total benefits for the sample. Group benefits divided by total sample benefits, then, provide a point estimate rather than range of the percentage of benefits in each of the groups under consideration. Estimates derived in this manner are shown in Table 10.

Using this technique and the information in Tables 6 through 9 and Tables A-6 through A-9, it was estimated that 8 percent of benefits of the burley tobacco program for the study went to the 9 percent of the quota owners under 35 years of age; 25 percent of the benefits went to the 27 percent of the quota owners between 36 and 50; 41 percent of the benefits went to the 39 percent of the quota owners between 51 and 65; and 25 percent of the benefits went to the 25 percent of the quota owners over 65. Thus, program benefits were distributed rather evenly among age groups.

TABLE 10. DISTRIBUTION OF BURLEY TOBACCO PROGRAM BENEFITS AMONG QUOTA OWNERS BY AGE, OCCUPATION, GROSS FARM INCOME, AND NONFARM INCOME FOR 44 SELECTED TENNESSEE COUNTIES, 1974

Quota Owner Characteristics	Categories	Percent Quota Owners	Percent Program Benefits
Age	35 and Under	9.4	8.3
	36 - 50	26.5	24.9
	51 - 65	38.8	41.4
	Over 65	25.3	25.4
Occupation	Full-time Farmer	28.0	36.0
	Part-time Farmer	40.5	35.0
	Full-time Nonfarm	10.6	9.0
	Other	20.9	20.0
Gross Farm Income	Under \$2500	62.9	47.0
	\$2500 - \$9999	27.6	36.0
	Over \$9999	9.5	18.0
Nonfarm Income	None	18.3	32.0
	Under \$2500	26.1	22.0
	\$2500 - \$7499	23.4	19.0
	Over \$7499	32.2	27.0

The benefits of the burley tobacco program were distributed among occupational groups as follows: 36 percent of the benefits went to the 28 percent of quota owners who were full-time farmers; 35 percent of the benefits went to the 41 percent of quota owners who were classified as part-time farmers; 9 percent of the benefits went to the 11 percent of the quota owners who were classified as full-time non-farmers; and 20 percent of the benefits went to the 21 percent of the quota owners classified as other. Full-time farmers received a larger than proportionate share of the program benefits while part-time farmers and full-time non-farmers received less than their proportionate share of benefits. Quota owners in the other category received a proportionate share of benefits.

The 63 percent of the quota owners who had gross farm incomes of less than \$2,500 received 47 percent of the quota owner benefits while the 28 percent with gross farm incomes between \$2,500 and \$9,999 received 36 percent, and those 10 percent with gross farm incomes above \$9,999 received 13 percent of the program benefits. Those quota owners with gross farm incomes of less than \$2,500 per year were the largest of the gross farm income groups but received far less than their proportionate share of benefits. However, quota owners whose gross farm income was above \$2,500 received more than their proportionate share. The larger the cash receipts, the wider the gap between benefits and income groupings.

From a non-farm income standpoint, those 18 percent of the quota owners whose non-farm income was zero received 32 percent of the quota owners benefits; the 26 percent with non-farm income between zero and \$2,500 received 22 percent; the 23 percent with non-farm income between

\$2,500 and \$7,499 received 19 percent; and the 32 percent with non-farm income over \$7,500 received 27 percent. Quota owners with zero non-farm incomes received a disproportionate share of the benefits while all other non-farm income categories received a less than proportionate share of the benefits.

These point estimates suggested that the program benefits were very small and were distributed among the various groups in essentially the same manner as quota. The amount of benefits received was usually \$500 or less and went to quota owners with \$2,500 or less gross farm income and/or \$2,500 or less non-farm income. Full-time farmers and quota owners with either gross farm incomes of \$2,500 or more or zero non-farm incomes all received a disproportionately large share of the program benefits when compared with others in their category.

CHAPTER 5

ESTIMATION OF THE QUOTA DEMAND MODEL

Regression analysis was used to estimate the statistical relationship between the price of burley tobacco quota and the amount of quota, tobacco prices, off-farm employment opportunities, wage rates, yield, available cropland, and the tobacco production area.

The analytical form used was linear in the variables. The linear form was chosen for two reasons: (1) previous research has shown that linear form equations perform adequately for this type of analysis, and (2) linear analysis lends itself to computational simplicity for the lease and transfer model calculations.

The models used to estimate these relationships were developed in detail in Chapter 3.¹ Definitions of the variables were shown in Table 3, page 40, for the variables used in each model. The three models examined differed only in the manner of handling regional differences. Model 1 included all of the continuous variables shown in Chapter 3 along with intercept dummy variables for production region and year. The variables used were as follows:

$A = f(Q/Q_d, P_{t-1}, WF_{t-1}, OFO, Y, TC, T_1, T_2, T_3, T_4, R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9).$

In Model 2, an interaction term between quantity of quota and region was included to allow for slope differences in the demand

¹SAS programming of OLS regression was used to estimate the parameters for all three models.

equation between the production regions. The interaction terms were derived by multiplying the regional dummy variable R_i by the quantity of quota, Q/Q_d . One interaction term was deleted in the computation process to avoid singularity. These interaction terms removed the constraint in Model 1 of a common slope for the demand curves for each of the regions. The variables for Model 2 were as follows:

$$A = f(Q/Q_d, P_{t-1}, WF_{t-1}, OFO, Y, TC, T_1, T_2, T_3, T_4, R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, Q'_1, Q'_2, Q'_3, Q'_4, Q'_5, Q'_6, Q'_7, Q'_8, Q'_9).$$

In Model 3 quota demand estimates were made separately for each of the regions. This independent estimation of an equation for each production region was analogous to assuming that each region was, in effect, a separate market.¹ The variables used for Model 3 were as follows:

$$A = f(Q/Q_d, P_{t-1}, WF_{t-1}, OFO, Y, TC, T_1, T_2, T_3, T_4).$$

In the estimated equations, the coefficients of the variables represented the change in demand for burley quota with a one-unit change in each variable, ceteris paribus, i.e., all other variables held constant. The constant term was the mean effect on the demand for quota of all excluded variables. Since dummy variables were included for both year and region, the constant term was interpreted as the mean effect of Year 1 (T_1) and Region 1 (R_1) on the quota demand as well as the effect of other excluded variables for those two models. For Model 3, dummy variables were included for time periods, but not for regions.

¹Sappington points out that such an analysis of time-series qualitative data is proper, simple, and useful; it also provides the best possible estimates of the true parameters obtainable using ordinary least squares (Sappington: 199).

For intercept change dummy variables, statistical significance was interpreted with respect to an excluded class. For dummy variables on years, significance was calculated in comparison to 1971, (T_1), the excluded year. Likewise, significance level for regions was interpreted in comparison with Region 1, the Tennessee Central Basin, the excluded region. In Model 2, the interaction term was an indication of the relationship between the regions and the effect of the quota variable.

Model 1

The estimated coefficients and tests of significance for Model 1 are shown in Table 11. Model 1 explained 62 percent of the variation in quota rental rates, i.e., $R^2 = .62$. Thirteen of the 17 variables were statistically significant at the 10 percent level or higher according to a one-tailed test: twelve at 1 percent and one at 5 percent. Region 2 was significant at the 5 percent level. Coefficients for wages, off-farm opportunity, Region 7, and Region 9 were not significant although each had the hypothesized sign.

Discussion of the Results of Model 1

Quota rental rate (A). Quota rental rate, the dependent variable in all models, was the variable that the models sought to explain. The mean of the variable was 20.19^1 and the standard deviation was 7.635.

¹This differs from the average quota rental rate shown in Table 5 because it is an average over four years (1971-74), while the average quota rental rate in Table 5 is for 1974 only.

TABLE 11. ESTIMATED COEFFICIENTS AND t VALUES OF REGRESSION ANALYSIS,^a
MODEL 1

Variable	Coefficient	t Value
Constant	1.7913	0.3015
Q/Q_d	-17.5374***	9.3019
P_{t-1}	0.1909***	2.7736
WF_{t-1}	- 0.0164	1.5942
OFO	- 0.0470	0.5999
Y	0.0062***	7.2654
TC	0.0247***	4.6520
T_2	5.0054***	5.4794
T_3	2.8787***	3.7113
T_4	8.8626***	5.1973
R_2	2.0737**	2.0418
R_3	3.7991***	4.1866
R_4	5.3135***	5.5273
R_5	8.3782***	8.0450
R_6	6.1569***	5.9099
R_7	- 0.3520	0.3100
R_8	6.1254***	6.3577
R_9	- 1.0768	1.2775

^aThe observed F-value is 55.86 which was significant at the .0001 level. The coefficient of variation was 23.49 which suggests that the regression equation fits the data reasonably well.

*Significant at the 10 percent level.

**Significant at the 5 percent level.

***Significant at the 1 percent level.

Quantity of quota (Q/Q_d). The coefficient of this variable indicated that a one-unit increase in the ratio of the quantity of quota in a county to the quota base for the county would decrease the quota rental rate by 17.54 cents per pound. In other words, if the amount of quota increased from 1.2 times the quota base to 2.2 times the quota base, all other things constant, the quota rental rate in the county would fall by 17.54 cents. The mean of the variable was 1.06 and the standard deviation was 0.168.¹

Price of burley (P_{t-1}). The mean price of burley for the study was 80.9 cents per pound and the standard deviation was 8.15. The coefficient estimated for tobacco price was 0.1909. This indicated that a 10 cent increase in the price of tobacco would increase the quota rental rate for the next year by approximately 2 cents per pound. The quota rental rate was sensitive to the tobacco price from the year before.

Wage rate (WF_{t-1}). Since no farm wage rate data was available, non-farm average wage rates for the county were used to account for the wage effects. The average wage rate was \$107.37 per week and the standard deviation was \$22.91. The estimated coefficient (-0.0164) indicated that a ten dollar weekly increase in the average county wage rate would decrease the next year's quota rental rate by approximately 0.16 cents per pound.

¹This mean and standard deviation apply to Q/Q_d and not to Q .

Off-farm opportunity (QFO). Off-farm opportunity was estimated using the ratio of non-farm to farm employment in the county. The mean of this variable was 9.05 and the standard deviation was 27.77. The coefficient in the estimated equation (-0.047) suggested that for every ten unit increase in the non-farm/farm employment ratio, the quota rental rate would decrease approximately 0.5 cents.

Yield (Y). Yield was included in the model to measure differences in soil productivity levels and managerial techniques in various counties. The average yield per acre for the study area was 2254.52 pounds per acre, and the standard deviation was 362.98. The estimated coefficient (.0062) indicated that for every pound increase in yield, the quota rental rate increased .0062 cents. In other words, if county 1 had a yield of 1,700 pounds per acre and county 2 had a yield of 2,700 pounds per acre, the quota rental rate in county 2 would be expected to be 6.2 cents per pound higher, ceteris paribus.

Total cropland (TC). Total cropland was included in the model to account for differences in market size for quota. A county with more cropland would likely have more tobacco quota transfers, ceteris paribus. The average amount of cropland per county for the study was 81.78 thousand acres and the standard deviation was 48.17. The estimated coefficient of total cropland of .0247 indicated that the quota rental rate for the county would increase by .0247 cents for each 1,000 acre increase in cropland, ceteris paribus.

Time (T). A dummy variable was included in the model for years to estimate the effect of change due to time. Year 1 was deleted and years

2, 3, and 4 had coefficients of 5.0054, 2.8787, and 8.8626, respectively. The change in year explained approximately 5.0 cents per pound of the difference between 1971 and 1972 quota rental rates, 2.9 cents per pound of the difference between 1971 and 1973 quota rental rates, and 8.9 cents per pound of the difference between the 1971 and 1974 quota rental rates.

Region (R). The study area was divided into nine different production regions. Region 1, the Tennessee Central Basin, was deleted for estimation purposes. In terms of per pound quota rental rate, the estimated coefficients indicated that, compared to Region 1, Region 2 was expected to be 2.07 cents higher; Region 3, 3.78 cents higher; Region 4, 5.31 cents higher; Region 5, 8.38 cents higher; Region 6, 6.16 cents higher; Region 7, 0.35 cents lower; Region 8, 6.13 cents higher; and Region 9, 1.08 cents lower.

Summary of Model 1

Model 1 conformed with expected results in general as indicated by the coefficients in Table 11. However, quota rental rate was expected to be more sensitive to tobacco price than indicated by the results of Model 1. Quota rental rate captured only about 20 percent of the increased tobacco price from the previous year. Costs of production may increase with tobacco price; in addition, uncertainty about market price at the time of the quota rental may result in some discounting by producers. Some adjustments to tobacco price change may be lagged more than one year. Wages and off-farm opportunity were not significantly related to price, but since proxy variables were used for both factors, true relationships may not have been identified.

Only two independent variables had correlation coefficients high enough to indicate any multicollinearity problem. There was some question if correlation with a dummy variable has any meaning and both cases just noted involved dummy variables. These were between Tobacco Price and Year 4 and between Quantity of Quota/Quota base ratio and Year 4. Both cases have a fairly obvious explanation. There was a relatively large increase in both tobacco price and amount of effective quota in 1974. The problem that resulted is commonly encountered in regression analysis especially when using time-series data. Correlation may result not only from causal relationships but also from common trends over time. The resulting multicollinearity causes the parameter estimates to be sensitive to both model specification and data set employed and results in high standard errors. As a result, certain estimates may be considered non-significant when, in fact, they are significant (Kane:278).

Correlation coefficient values approaching ± 0.90 are signals suggesting the possible existence of multicollinearity problems in the model (Kane:278). In Model 1, neither of the two correlation coefficients already mentioned approached ± 0.90 . The independent variables with the highest correlation coefficients were significant. It was concluded that no serious multicollinearity problem existed with Model 1.

Model 2

Model 2 was developed to test the hypothesis that each of the production regions not only had a separate intercept value but also a

separate slope of the quota demand relationship. Interaction terms, region multiplied by quantity of quota, were included to permit measurement of possible differences in the slope for the quota demand function for each region. The estimated equation had a slightly higher explanatory power of the variation in quota rental rates than Model 1, as seen by a comparison of the coefficients of Model 1 in Table 11 and Model 2 in Table 12. Overall, Model 2 explained 65 percent of the variation in quota rental rates, i.e., $R^2 = .65$.

In addition to the Model 1 variables, Model 2 included eight slope interaction terms to account for possible differences in quota demand relationship for each of the production regions except the one deleted to avoid singularity. Of the 25 variables, 18 were significant compared with 13 of 17 for Model 1. Wages, Region 2, and Region 3 were all significant at the 10 percent level. Tobacco price, Region 6, and interaction terms 2, 3, 5, and 8 were all significant at the 5 percent level. Quantity of quota, yield, total cropland, years 2, 3, and 4, Region 4, and interaction terms 4 and 7 were all significant at the 1 percent level. Only off-farm opportunity, Regions 5, 7, 8, and 9, and interaction terms 7 and 9 were not significant.

Among the continuous variables, notable changes in comparison to Model 1 were as follows: non-farm wages, which in Model 1 was not significant, was significant at the 10 percent level; tobacco price, which was significant at the 1 percent level in Model 1, was significant at the 5 percent level in Model 2. There were some shifts in the dummy variable significance as shown from a comparison of Tables 11 and 12.

TABLE 12. ESTIMATED COEFFICIENTS AND t VALUES OF REGRESSION ANALYSIS,^a
MODEL 2

Variable	Coefficient	t Value
Constant	- 8.0187	1.1602
Q/Q _d	-24.0641***	6.2277
P _{t-1}	0.1542**	2.2352
WF _{t-1}	- 0.0172*	1.7080
OFO	- 0.0040	0.0498
Y	0.0079***	8.7666
TC	0.0251***	4.8404
T ₂	5.7488***	6.3804
T ₃	3.5701***	4.6708
T ₄	9.8189***	5.8052
R ₂	-10.1203*	1.8421
R ₃	- 9.9136*	1.8334
R ₄	-18.3671***	3.3222
R ₅	- 7.5245	1.0987
R ₆	-19.5522**	2.2398
R ₇	- 7.0431	1.0517
R ₈	- 9.6804	1.4872
R ₉	0.1212	0.0248
Q ₂	10.9955**	2.1922
Q ₃	12.2572**	2.4954
Q ₄	21.9500***	4.3300
Q ₅	14.4600**	2.2429
Q ₆	24.6269***	2.8816
Q ₇	5.7982	0.9530
Q ₈	14.1980**	2.4109
Q ₉	- 1.2755	0.2948

^aThe observed F-value was 47.97 which was significant at the .0001 level. The coefficient of variation was 22.81 which suggests that Model 2 fits the data reasonably well.

*Significant at the 10 percent level.

**Significant at the 5 percent level.

***Significant at the 1 percent level.

Discussion of the Results of Model 2

Quantity of quota (Q/Q_d). The coefficient of quantity of quota (-24.06) indicated that a one-unit increase in the ratio of a county's quantity of quota to its quota base would decrease the quota rental rate by 24.06 cents per pound. Thus, if the amount of quota in a county increased from 1.2 times the county's base quota to 2.2 times that base quota, the average quota rental rate would be expected to fall by 24.06 cents per pound. The magnitude of the effect of Q/Q_d estimated in Model 2 was considerably larger than the estimate of -17.54 in Model 1.

Price of burley (P_{t-1}). The estimated coefficient for tobacco price in Model 2 was 0.15417 compared with 0.19092 in Model 1. According to Model 2 results, a 1.5 cent increase in quota rental rate would result for every 10 cent increase in tobacco price, while Model 1 suggested a 1.9 cent rise. Thus in Model 2, burley price was estimated to have only three-fourths the impact estimated in Model 1.

Wage rate (WF_{t-1}). The non-farm wage coefficient of -0.0172 indicated that a ten dollar a week increase in the average weekly wage rate in the county would decrease the next year's quota rental rate by 0.17 cents per pound. This was only slightly different from the estimated change of 0.16 in Model 1.

Off-farm opportunity (OFO). This measure of the ratio of non-farm to farm employment in the county was estimated to decrease the quota rental rate by four cents for every 1,000 unit increase in the ratio in Model 2. In Model 1, the estimated impact of 4.7 cents for every 100 unit increase in the ratio was more than 10 times as large as in

Model 2. The coefficient for OFO was .047 in Model 1 and .004 in Model 2.

Yield (Y). In Model 2, the coefficient of yield, 0.0079, indicated that for every 1,000 pound increase in average county yield per acre, the county average quota rental rate was expected to increase by 7.9 cents. The estimate of the impact of the same change in Model 1 was 6.2 cents increase in quota rental rate per 1,000 pound increase in yield.

Total cropland (TC). The estimated coefficient for total cropland was almost the same in Models 1 and 2, 0.0247 and 0.0251, respectively. A 100,000 acre cropland increase in a county was estimated to increase quota rental rate by approximately 2.5 cents in both cases.

Time (T). The estimated coefficients of time in Model 2 indicated that the effect of change due to time from the base year 1971 was to increase the county average quota rental rate by 5.7488 cents for 1972, 3.5701 cents for 1973, and 9.8189 cents for 1974. The coefficients for time were slightly larger for Model 2 than for Model 1.

Region (R). Region 1 was deleted for estimation purposes as in Model 1. In Model 2, only one of the regions was significant at the 1 percent level, but five had been in Model 1. Both models had one region significant at the 5 percent level. Two regions were significant at the 10 percent level in Model 2, but none were in Model 1. Four of the regions in Model 2 were not significant; only one had not been significant in Model 1. In addition, Model 2 regional dummies

had very different coefficients in both magnitude and sign as compared to Model 1.

In Model 1, the equation used permitted only differences in the quota demand function, while in Model 2 both the slope and the level were allowed to vary. Regional differences in Model 2 were captured in both region and interaction terms so the significance and effect of the region variables in Model 2 could not be directly inferred from a single coefficient.

Interaction terms (Q'_i). The interaction dummy variables were the slope changers for the regions and were not included in Model 1. The effects of quota (Q/Q_d), as well as region, were reflected in these interaction terms. Thus, the interaction terms showed the relative effect of quota in the various regions, i.e., the interaction between quota and region. Six of the eight were significantly different from the deleted interaction term Q'_1 , two at 1 percent and four at 5 percent levels of significance.

The coefficient of Q' indicated that Region 2 was expected to have an average county quota rental rate 10.99 cents per pound higher than Region 1. Compared on a cents per pound basis with Regional Interaction Term 1 (Q'_1), Q'_3 would average 12.26 cents higher; Q'_4 , 21.95 cents higher; Q'_5 , 14.46 cents higher; Q'_6 , 24.63 cents higher; Q'_7 , 5.80 cents higher; Q'_8 , 14.20 cents higher; and Q'_9 , 1.28 cents lower.

Summary of Model 2

Like Model 1, results from Model 2 generally conformed to expectations. Quota rental rate was not particularly sensitive to changes in the price of tobacco as only 15 percent of the variation in tobacco

price was explained in this manner. This result is partially explained by sales of quota at market time which are unaccounted for. The wage coefficient was significant only at the 10 percent level, and the coefficient for off-farm opportunity was not significant.

The correlation matrix contained evidence of multicollinearity problems. As would be expected, each of the interaction terms had a high degree of correlation with its corresponding regional variables. All had correlation coefficients of .97 or higher. This multicollinearity likely caused variables in Model 2 to appear not to be as significant as they really were, particularly the interaction terms and the regional variables.

Model 3

Model 3 included the same variables as Model 1, except that the regional dummy variables were not included in Model 3. A demand equation was estimated separately for each of the nine regions. If the quota demand relationship was different for different regions, then this manner of estimation would most closely approximate the true equations and provide the best possible estimates of the true parameters obtainable using ordinary least squares (Sappington:199).

The results for Model 3 are shown in Table 13. The last digit of the subscript for each equation indicates the region for which the equation was estimated. Significant variables were minimal in comparison to Models 1 and 2. At one extreme, three regions had only one significant variable while, at the other extreme, Region 6 had six significant variables. In Model 1, seven of the nine corresponding variables were significant; in Model 2, eight of them were significant. The R^2 's

TABLE 13. ESTIMATED COEFFICIENTS AND t VALUES OF REGRESSION ANALYSIS, MODEL 3 WITH EQUATIONS FOR REGIONS 1 THROUGH 9

Equation	Constant	Q/Q _d	P _{t-1}	WF _{t-1}	OFO	Y	TC	T ₂	T ₃	T ₄	R ²	F Value	C.V.
A ₃₁	5.9257 (0.1042)	-10.5334 (1.6114)	- .2078 (0.2582)	*** -0.0685 (2.6772)	*** 4.4820 (3.1602)	*** 0.0203 (6.3988)	*** -0.0145 (1.4649)	4.5360 (0.6808)	-1.6548 (0.3266)	11.1624 (0.6719)	0.7109	11.4731	25.0398
A ₃₂	-110.2037 (1.8318)	-6.4901 (1.3448)	1.8346 (2.2207)	** -0.0617 (0.9656)	0.3817 (0.1555)	0.0041 (1.2192)	0.0059 (0.2855)	-12.8813 (1.5404)	-8.0732 (1.1993)	-27.9799 (1.4864)	0.6052	5.7913	24.2862
A ₃₃	-65.2959 (1.3652)	-11.1105 (1.3949)	0.7962 (1.2689)	0.0240 (1.1185)	0.0070 (0.0356)	0.0124 (4.2233)	*** 0.0324 (1.9804)	0.9431 (0.1496)	-1.5900 (0.3273)	-0.2544 (0.0171)	0.5678	10.2190	25.3084
A ₃₄	29.9727 (0.5472)	-1.4952 (0.2754)	-0.0346 (0.0449)	-0.0728 (1.5801)	-0.0756 (0.0717)	-0.0001 (0.0064)	** 0.0333 (2.3315)	4.7228 (0.6008)	5.8340 (0.9873)	8.8746 (0.5082)	0.3024	3.3710	18.4809
A ₃₅	26.1089 (0.9328)	-21.0985 (2.1641)	0.1505 (0.3779)	0.0187 (0.5355)	-2.3080 (2.2844)	0.0020 (0.5664)	0.0147 (0.5807)	3.6760 (0.8704)	0.7399 (0.2482)	7.1565 (0.8233)	0.3635	2.6648	11.5689
A ₃₆	159.6422 (2.1354)	-3.2788 (0.2008)	-2.0954 (2.3525)	0.1012 (1.8593)	-17.3990 (2.2735)	0.0034 (0.5996)	0.0057 (0.2354)	*** 22.9690 (2.7223)	*** 21.1925 (3.2849)	*** 54.6904 (2.8435)	0.5152	4.0144	16.1931
A ₃₇	-72.1661 (1.1278)	-6.1592 (0.7426)	0.9992 (1.1632)	0.0315 (0.2657)	-2.6526 (1.4429)	0.0088 (3.8475)	-0.0359 (0.8264)	-2.5438 (0.4389)	-4.3212 (0.7957)	-12.2099 (0.7044)	0.6806	5.2092	18.3402
A ₃₈	14.5294 (0.9819)	-13.6705 (1.4677)	0.0419 (0.6187)	-0.0155 (0.4993)	-1.9255 (1.6806)	0.0063 (1.9772)	0.0065 (0.2461)	*** 8.6999 (3.6058)	*** 4.3993 (2.7047)	*** 12.4751 (4.6485)	0.4744	7.0189	19.4293
A ₃₉	-103.7511 (2.7800)	-28.7486 (8.6514)	1.7142 (3.2550)	0.0356 (1.6911)	-0.0819 (0.3944)	0.0059 (3.5087)	*** 0.0444 (4.5108)	-5.7708 (1.2275)	-4.9991 (1.2023)	-20.7324 (1.8764)	0.6778	26.6445	28.3994

*Significant at the 10 percent level.

**Significant at the 5 percent level.

***Significant at the 1 percent level.

for the nine regions in Model 3 ranged from .30 to .72. In four regions R^2 's were above .60. This compared with R^2 's of .62 and .65 for Models 1 and 2 respectively.

Discussion of the Results of Model 3

Quantity of quota (Q/Q_d). The coefficient of quantity of quota ranged from -28.75 for Region 9 to -1.50 for Region 4. A one unit decrease in Q/Q_d would increase the quota rental rate for a county between 1.5 and 28.75 cents. The wide range in responsiveness to quota level in the various regions resulted from the variation in the amount of excess quota available in each region. The amount of quota available in each region clearly had a marked impact on the responsiveness of the quota rental rate to changes in effective quota.

Price of burley (P_{t-1}). In Region 6, the estimated coefficient for burley price was -2.10, while in Region 2, it was 1.83. Thus, in Region 6, a one cent increase in the burley price would decrease the quota rental rate by 2.1 cents, while in Region 2, a one cent increase in the burley price would increase the quota rental rate by 1.84 cents per pound. The sign of the coefficient for burley price was the opposite of that hypothesized for Regions 1, 4, and 6. These adverse signs are difficult to explain. Possibly the effect of quota was overshadowed by some other effect in the opposite direction. The coefficient for burley price in Regions 2 and 9 implied that a one cent increase in the burley price would raise quota rental rates by an average of 1.83 cents and 1.71 cents respectively. This magnitude of effect was also unexpected, and no explanation for these results was obvious.

Wage rate (WF_{t-1}). The non-farm wage coefficient for the regions ranged from -0.0155 to -0.1012, a range comparable to Models 1 and 2, and had the expected signs.

Off-farm opportunity (OFO). The range of impact of the OFO variable differed greatly between regions. The effect of a one unit increase in the ratio of non-farm to farm employment on quota rental rates varied from a decline of 1.74 cents per pound to a gain of .448 cents. Six of the nine regions had negative signs for the coefficient for OFO. Either the hypothesis concerning the OFO variable was incorrect or the variable was capturing some other effect in six of the regions.

Yield (Y). The yield variable in Model 3 reacted much the same as in Models 1 and 2 with exception of Region 4 where the coefficient was negative although very small (-0.0001). The coefficients for the other regions ranged from 0.0020 to 0.0203. This indicated that a 100 pound per acre increase in the average county yield would increase the quota rental rate from 0.20 cents to 2.03 cents. In Region 4, the same increase would produce a .01 cent decline in the quota rental rate.

Total cropland (TC). All of the estimated coefficients for total cropland had the expected sign except for Regions 1 and 7. The other estimated coefficients were similar to the ones derived for Models 1 and 2.

Time (T). In four of the nine regions, the coefficients of the time variable indicated that over time the quota rental rate was increasing. Another four regions showed the opposite pattern of quota rental rate decreasing over time. The remaining region showed mixed

results: increases in two years and a decrease in one year. The regions with positive coefficients seemed to be an indication that all of the quota was being utilized each year compared with the negative coefficient regions where there was a gradual buildup of effective quota from carryover each year. In both Models 1 and 2, effects of time were all positive compared to 1971.

Summary of Model 3

The results of Model 3 differed substantially from expectations in several instances. Some of the equations had only one of nine variables that was significant. Three of the equations had price variable coefficients with signs opposite of that hypothesized. The off-farm opportunity variable had the opposite sign from that hypothesized in six of the nine equations.

Results of the quantity of quota variables were mixed. The coefficients were all the hypothesized sign and showed a wide variation in level, but the variable was significant in only two of the nine equations. The nine R^2 values varied between .30 and .72. The model showed no evidence of multicollinearity problems.

Comparison of the Three Models

The major differences in the estimates of the first two models were the regional interaction terms added to Model 2. With this addition, Model 2 was almost identical to a model where each of the regions was estimated by a separate equation, although Model 2 had both greater degrees of freedom and a higher probability of multicollinearity problems.

Use of the interaction terms and the regional dummy variables in Model 2 provided clear evidence that separate quota demand functions existed for the different regions. In Model 1, it was assumed that the demand function was the same for each of the regions. In Model 2, different quota demand functions were possible for each region with different slopes and levels. The results of Model 2 lend validity to the assumption that both the slope and the intercept vary by region.

The standard error values shown in Table 14 are five or six times higher in Model 2 than in Model 1 as a result of the high level of multicollinearity in Model 2 caused by the introduction of the interaction terms. This was a logical result of the form of the equation. Multicollinearity likely kept some of the variables in Model 2, particularly the regional dummies and interaction terms, from appearing significant when they really were.

The estimated coefficients in the models clearly showed some different patterns. Models 2 and 3 both gave strong indications that the quota demand function was not the same for all of the burley belt as was assumed in Model 1. In addition, Model 3 avoided the multicollinearity problems of Model 2.

From a sample standpoint, the disadvantage of Model 3 was that with nine separate regressions, the number of observations varied from 32 to 124. In Models 1 and 2, all 588 observations were used in one regression. The sum of squares explained was only the variation within the groups in Model 3, but it was the total of the variation within and between the groups for Models 1 and 2. The R^2 was higher for Models 1 and 2 than for most equations of Model 3.

TABLE 14. COMPARISON OF STANDARD ERRORS OF THE b VALUES BETWEEN MODELS 1 AND 2

Region	Model 1	Model 2
Region 2	1.0156	5.4939
Region 3	0.9026	5.4074
Region 4	0.9613	5.5286
Region 5	1.0414	6.8486
Region 6	1.0418	8.7294
Region 7	1.1353	6.6968
Region 8	0.9635	6.5092
Region 9	0.8429	4.8842

Model 1 had the highest percentage of significant variables of the three models and explained 62 percent of the variation in quota rental rate. The model was constrained, however, by the assumption that the demand equations for each of the regions were the same except that the intercepts were at different levels.

Model 2 eliminated the constraint of a common demand function, had almost as high a proportion of significant variables, and explained 65 percent of the variation in quota rental rate. The model, however, had serious multicollinearity problems.

Model 3 equations generally had a smaller proportion of significant variables than either Models 1 or 2 as well as lower explanatory power in six of the nine equations. The model, however, eliminated both the multicollinearity problems and the constraint of a common demand function for each of the regions. The quantity of quota variable had coefficients that were more nearly as hypothesized than either Model 1 or 2.

CHAPTER 6

CROSS COUNTY QUOTA TRANSFER

One major proposed program change for both flue-cured and burley tobacco receiving considerable attention in the tobacco industry is the lease and transfer of tobacco quota across county and state lines. Objective four of this study was directed at examining the effects of this proposed change. This objective entailed prediction of an equilibrium quota rental rate and distribution of quota for the study area with interstate and intrastate transferability of quota. This prediction was based on parameters estimated in the Quota Demand Model in Chapter 5 and the Quota Lease and Transfer Model developed in Chapter 3 to simulate the change in quota rental rules.

Choice of the Demand Coefficients for Use in the Quota Lease and Transfer Model

Quota Demand Model 3 results were chosen for use in simulating the quota rental rules change with the Quota Lease and Transfer Model. Model 3 was used in spite of two main problems. One, the estimated equations for the regions generally had lower R^2 's and fewer significant variables than either Model 1 or 2. Two, for the equations estimated in Model 3, the number of observations was much lower.

The R^2 's of Models 1 and 2 were not strictly comparable to Model 3 for in both Models 1 and 2, dummy variables were used to account for regional differences so that the model captured not only the variation within, but also between, production regions. In Model 3, however, the

explained variation for each equation was the variation only within the region. Therefore, comparisons of R^2 's of the equations of Model 3 with Models 1 and 2 were misleading.

Sappington, in his analysis of the use of dummy variables, concluded, "Independent estimation of each qualitative or cross-sectional group will give the best possible estimates of the parameters. The R^2 will probably be lower than with other proper methods and degrees of freedom may be a problem" (Sappington:201). Since the main objective of the quota demand model estimation was to obtain the best possible parameters for use in the Quota Lease and Transfer Model, Quota Demand Model 3, which estimates the demand for each region separately, was chosen.

Quota Lease and Transfer Model

The Quota Lease and Transfer Model simulates a quota transfer market which would allow quota to be transferred across county lines as well as within counties subject to a set of constraints. The model was originally developed to predict the sale, distribution, and equilibrium rental rate for flue-cured tobacco quota (Efstratoglou:90-2). No real differences between the transfer mechanism for flue-cured and burley tobacco exist, but several technical modifications were necessary to accommodate differences in the quota demand model. Also, different constraints were used since burley producers faced different constraints than flue-cured producers.

Quota Transfer Rules

The Quota Lease and Transfer Model was used to simulate the quota transfer response to changing the quota rental rules. This transfer

was assumed to be costless. Unique equilibriums of quota distribution and quota rental rates were assumed to exist for the quota market.

Two different quota transfer rules were examined in the study. The first allowed quota to be transferred between counties in all of the 147 county study area, hereafter referred to as interstate transfer. The second rule allowed transfer between only the counties in each of the three states, hereafter referred to as intrastate transfer.

For both transfer situations, free trade of quota was simulated. Predictions of the equilibrium rental rate and distributions of quota were made using the Quota Lease and Transfer Model based on the coefficient of quantity of quota in the Quota Demand Model 3. It was assumed that the parameters estimated in the Quota Demand Model were valid for predicting what would happen in response to changing quota rental rules.

Quota Transfer Constraints

The Quota Lease and Transfer Model was solved subject to three constraints. The first was the import-export constraint to insure that total imports could not exceed the total exports of quota. A second constraint was placed on the absolute amount of quota that could be transferred into a county. Two forms of this constraint were applied, the first permitting twice the county quota and the second permitting three times the county quota to be imported. The assumption behind this constraint was that in the short to medium run, expansion by producers would be limited by factors not included in the Quota Demand Model, for example, barn space limitations on individual farms.

Tennessee producers indicated an average excess barn space of 4,229 pounds as compared to an average quota size of 1,554 pounds. A third

constraint was used to assure that no county would export more quota than it was allotted. The model was also restricted by the computer program used to solve the equilibrium quota rental rate to the nearest whole cent. The solution was then actually not a unique equilibrium, but the closest whole cent to the unique equilibrium. Consequently, county quota gains and losses did not sum exactly to zero.

Model Specifications

The Quota Lease and Transfer Model was developed in detail in Chapter 3 and the terms were defined in Table 3, page 40. The model is as follows:

$$A_e - A_c = b_1 \frac{Q_{ec} - Q_c}{Q_{dc}}, \text{ subject to } 1) \sum_{c=1}^c Q_{ec} - Q_c = 0,$$

$$2) Q_{ec} - Q_c \leq 1 Q_c,$$

$$Q_{ec} - Q_c \leq 2 Q_c, \text{ and}$$

$$3) Q_{ec} \geq 0.$$

Quota Lease and Transfer Model Results

The four alternative versions of the Lease and Transfer model were based on the two maximum quota transfer constraints and the two quota transfer rules. In Table 15, the four equations were labeled T_{ij} where i referred to the maximum quantity constraint ($1 = 2Q_c$ and $2 = 3Q_c$) and j referred to the quota transfer rule ($1 = \text{interstate transfer}$ and $2 = \text{intrastate transfer}$).

Effects of Quota Transfer Constraints

The effect of the maximum quantity constraint was evident in the differences between Models T_{11} and T_{21} or between T_{12} or T_{22} in Table 15. Adair County was one of the counties where the effect of the quantity

TABLE 15. ESTIMATED COUNTY DISTRIBUTION OF BURLEY QUOTA UNDER TWO QUANTITY CONSTRAINTS AND TWO TRANSFER RULES

State	T ₁₁ ^a		T ₁₂ ^b		T ₂₁ ^c		T ₂₂ ^d	
	EQQ ^e	G/L ^f	EQQ	G/L	EQQ	G/L	EQQ	G/L
<u>KENTUCKY</u>								
Adair	8,968	+ 4,484	8,968	+ 4,484	9,814	+ 5,330	8,482	+ 3,998
Allen	1,528	- 1,995	530	- 2,993	530	- 2,993	0	- 3,523
Anderson	3,729	- 143	3,586	- 286	3,586	- 286	3,443	- 429
Barren	3,132	+ 1,566	3,132	+ 1,566	4,968	+ 3,132	4,698	+ 3,132
Bath	24,156	+12,078	20,300	+ 8,222	20,300	+ 8,222	16,189	+ 4,111
Boone	0	- 3,532	0	- 3,532	0	- 3,532	0	- 3,532
Bourbon	23,828	+11,914	23,828	+11,914	26,164	+14,250	19,039	+ 7,125
Boyle	4,728	0	4,513	- 215	4,513	- 215	4,299	- 429
Bracken	8,129	+ 908	7,827	+ 606	7,827	+ 606	7,524	+ 303
Breathitt	684	- 756	600	- 840	600	- 840	516	- 924
Breckinridge	6,533	- 1,170	5,948	- 1,755	5,948	- 1,755	5,363	- 2,340
Bullitt	314	- 1,252	210	- 1,356	210	- 1,356	106	- 1,460
Butler	129	- 807	62	- 874	62	- 874	0	- 936
Caldwell	0	- 1,304	0	- 1,304	0	- 1,304	0	- 1,304
Campbell	819	- 111	763	- 167	763	- 167	708	- 222
Carroll	5,795	+ 1,704	5,625	+ 1,534	5,625	+ 1,534	5,455	+ 1,364
Carter	3,318	- 216	3,210	- 324	3,210	- 324	3,102	- 432
Casey	5,160	- 787	4,767	- 1,180	4,767	- 1,180	4,373	- 1,574
Christian	805	- 6,017	0	- 6,822	0	- 6,822	0	- 6,822
Clark	0	- 7,200	0	- 7,200	0	- 7,200	0	- 7,200
Clay	2,588	- 365	2,406	- 547	2,406	- 547	2,223	- 730
Clinton	4,652	+ 2,326	4,367	+ 2,041	4,367	+ 2,041	3,687	+ 1,361
Cumberland	1,097	- 1,515	340	- 2,272	340	- 2,272	0	- 2,612
Davies	10,084	+ 2,996	9,085	+ 1,997	9,085	+ 1,997	8,087	+ 999
Edmonson	919	- 1,086	764	- 1,241	1,764	- 1,241	609	- 1,396
Elliott	2,014	- 279	1,874	- 419	1,874	- 419	1,735	- 558

TABLE 15. (Continued)

State	T ₁₁ ^a		T ₁₂ ^b		T ₂₁ ^c		T ₂₂ ^d	
	EQQ ^e	G/L ^f	EQQ	G/L	EQQ	G/L	EQQ	G/L
Estill	1,559	- 200	1,459	- 300	1,459	- 300	1,359	- 400
Fayette	0	-12,867	0	-12,867	0	-12,867	0	-12,867
Fleming	15,098	+ 7,549	15,098	+ 7,549	22,647	+15,098	22,647	+15,098
Franklin	5,686	- 484	5,445	- 725	5,445	- 725	5,203	- 967
Gallatin	2,802	+ 473	2,708	+ 379	2,708	+ 379	2,613	+ 284
Garrard	11,040	+ 3,375	10,702	+ 3,037	10,702	+ 3,037	10,365	+ 2,700
Grant	6,466	- 487	6,223	- 730	6,223	- 730	5,979	- 974
Grayson	5,494	+ 948	5,166	+ 656	5,166	+ 656	4,838	+ 328
Green	10,019	+ 4,276	9,484	+ 3,741	9,484	+ 3,741	8,950	+ 3,207
Greenup	1,792	- 261	1,662	- 391	1,662	- 391	1,531	- 522
Hancock	2,890	+ 590	2,694	+ 394	2,694	+ 394	2,497	+ 197
Hardin	4,080	- 710	3,725	- 1,065	3,725	- 1,065	3,370	- 1,420
Harrison	10,245	0	4,510	- 5,735	4,510	- 5,735	0	-10,245
Hart	15,209	+ 6,129	14,443	+ 5,363	14,443	+ 5,363	13,677	+ 4,597
Henderson	0	- 1,182	0	- 1,182	0	- 1,182	0	- 1,182
Henry	20,196	+10,098	20,196	+10,098	30,294	+20,196	30,294	+20,196
Hopkins	128	- 452	95	- 485	95	- 485	63	- 517
Jackson	3,809	+ 633	3,598	+ 422	3,598	+ 422	3,387	+ 211
Jefferson	444	- 463	392	- 515	392	- 515	341	- 566
Jessamine	0	- 7,212	0	- 7,212	0	- 7,212	0	- 7,212
Johnson	337	- 640	284	- 693	284	- 693	230	- 747
Kenton	1,248	- 483	1,127	- 604	1,127	- 604	1,006	- 725
Knox	857	- 408	789	- 476	789	- 476	721	- 544
Larue	5,566	+ 2,154	5,297	+ 1,885	5,297	+ 1,885	5,028	+ 1,616
Laurel	4,719	0	4,428	- 291	4,428	- 291	4,137	- 582
Lawrence	331	- 612	280	- 663	280	- 663	229	- 714

TABLE 15. (Continued)

State	T ₁₁ ^a		T ₁₂ ^b		T ₂₁ ^c		T ₂₂ ^d	
	EQQ ^e	G/L ^f	EQQ	G/L	EQQ	G/L	EQQ	G/L
Lee	628	- 81	588	- 121	588	- 121	548	- 161
Lewis	6,080	+ 964	5,759	+ 643	5,759	+ 643	5,437	+ 321
Lincoln	12,815	+ 5,546	10,336	+ 3,697	10,336	+ 3,697	8,488	- 1,849
Logan	2,888	- 966	2,405	- 1,449	2,045	- 1,449	1,922	- 1,932
Lyon	79	- 434	43	- 470	43	- 470	6	- 507
McLean	1,109	- 433	892	- 650	892	- 650	675	- 867
Madison	22,884	+11,442	22,884	+11,442	25,051	+13,609	18,246	+ 6,804
Magoffin	1,317	- 603	1,196	- 724	1,196	- 724	1,075	- 845
Marion	10,934	+ 5,467	10,934	+ 5,467	16,401	+10,934	16,401	+10,934
Mason	0	- 9,378	0	- 9,378	0	- 9,378	0	- 9,378
Meade	1,602	- 277	1,464	- 415	1,464	- 415	1,325	- 554
Menifee	1,849	+ 312	1,745	+ 208	1,745	+ 208	1,641	+ 104
Mercer	6,822	- 621	6,512	- 931	6,512	- 931	6,201	- 1,242
Metcalfe	10,148	+ 4,697	8,583	+ 3,132	8,583	+ 3,132	7,017	+ 1,566
Monroe	7,484	+ 3,742	7,484	+ 3,742	7,894	+ 4,152	6,856	+ 3,114
Montgomery	13,070	+ 6,535	10,658	+ 4,123	10,658	+ 4,123	6,535	0
Morgan	3,857	- 284	3,574	- 567	3,574	- 567	3,290	- 851
Muhlenberg	0	- 1,200	0	- 1,200	0	- 1,200	0	- 1,200
Nelson	9,554	+ 4,777	9,554	+ 4,777	10,216	+ 5,439	7,496	+ 2,719
Nicholas	6,612	+ 716	6,373	+ 477	6,373	+ 477	6,135	+ 239
Ohio	1,848	- 1,147	1,618	- 1,377	1,618	- 1,377	1,389	- 1,606
Oldham	0	- 1,924	0	- 1,924	0	- 1,924	0	- 1,924
Owen	9,414	+ 665	9,081	+ 332	9,081	+ 332	8,749	0
Owsley	1,682	- 242	1,561	- 363	1,561	- 363	1,440	- 484
Pendleton	4,862	- 1,297	4,646	- 1,513	4,646	- 1,513	4,430	- 1,729
Powell	1,029	- 136	960	- 205	960	- 205	892	- 273
Pulaski	12,697	+ 5,525	10,855	+ 3,683	10,855	+ 3,683	9,014	+ 1,842

TABLE 15. (Continued)

State	County	T ₁₁ ^a		T ₁₂ ^b		T ₂₁ ^c		T ₂₂ ^d	
		EQQ ^e	G/L ^f	EQQ	G/L	EQQ	G/L	EQQ	G/L
TENNESSEE	Robertson	2,533	- 232	2,417	- 348	2,417	- 348	2,301	- 464
	Rockcastle	6,706	+ 3,353	6,706	+ 3,353	9,544	+ 6,191	8,660	+ 5,307
	Rowan	1,771	+ 113	1,658	0	1,658	0	1,545	- 113
	Russell	1,644	- 1,848	721	- 2,771	721	- 2,771	0	- 3,492
	Scott	0	-11,240	0	-11,240	0	-11,240	0	-11,240
	Shelby	25,294	+12,647	25,294	+12,647	29,266	+14,319	19,807	+ 7,160
	Simpson	1,143	- 1,145	857	- 1,431	857	- 1,431	570	- 1,718
	Spencer	9,098	+ 4,549	9,098	+ 4,549	13,647	+ 9,098	12,055	+ 7,506
	Taylor	8,361	+ 3,448	7,930	+ 3,017	7,930	+ 3,017	7,499	+ 2,586
	Todd	410	- 2,515	50	- 2,875	50	- 2,875	0	- 2,925
	Trigg	741	- 1,124	516	- 1,349	516	- 1,349	291	- 1,574
	Trimble	8,508	+ 4,254	8,508	+ 4,254	9,257	+ 5,003	6,755	+ 2,501
	Warren	4,783	- 1,800	3,884	- 2,699	3,884	- 2,699	2,984	- 3,599
	Washington	8,886	+ 1,806	8,660	+ 1,580	8,660	+ 1,580	8,435	+ 1,355
	Wayne	5,598	+ 2,481	4,771	+ 1,654	4,771	+ 1,654	3,944	+ 827
	Webster	0	- 467	0	- 467	0	- 467	0	- 467
	Wolfe	1,843	- 279	1,704	- 418	1,704	- 418	1,565	- 557
	Woodford	0	-10,854	0	-10,854	0	-10,854	0	-10,854
	Blount	1,230	- 1,113	1,720	- 623	1,185	- 1,158	1,675	- 668
	Campbell	727	- 519	1,063	- 183	697	- 549	1,032	- 214
	Carter	1,626	- 1,232	2,423	- 435	1,553	- 1,305	2,351	- 507
	Claiborne	5,214	- 321	6,980	+ 1,445	5,053	- 482	6,819	+ 1,284
	Clay	358	- 1,176	2,514	+ 980	162	- 1,372	2,318	+ 784
	Cocke	2,292	- 1,504	3,474	- 322	2,184	- 1,612	3,366	- 430
	DeKalb	0	- 2,295	657	- 1,638	0	- 2,295	385	- 1,910
	Giles	0	- 1,353	841	- 512	0	- 1,353	756	- 597

TABLE 15. (Continued)

State	County	T ₁₁ ^a		T ₁₂ ^b		T ₂₁ ^c		T ₂₂ ^d	
		EQQ ^e	G/L ^f	EQQ	G/L	EQQ	G/L	EQQ	G/L
	Grainger	2,372	- 994	3,465	+ 99	2,272	- 1,094	3,366	0
	Greene	8,329	- 2,421	12,133	+ 1,383	7,984	- 2,766	11,787	+ 1,037
	Hamblen	1,871	- 653	2,669	+ 145	1,798	- 726	2,597	+ 73
	Hancock	2,583	- 164	3,487	+ 740	2,500	- 247	3,405	+ 658
	Hawkins	4,876	- 1,110	6,620	+ 634	4,717	- 1,269	6,462	+ 476
	Jackson	0	- 2,390	2,072	- 318	0	- 2,390	1,755	- 635
	Jefferson	2,519	- 804	3,502	+ 179	2,430	- 893	3,412	+ 89
	Johnson	1,832	- 1,069	2,812	- 89	1,743	- 1,158	2,723	- 178
	Knox	1,457	- 877	2,024	- 310	1,405	- 929	1,973	- 361
	Lincoln	0	- 1,857	985	- 872	0	- 1,857	861	- 996
	Loudon	1,140	- 966	1,699	- 407	1,090	- 1,016	1,649	- 457
	McMinn	1,399	- 1,349	2,073	- 675	1,338	- 1,410	2,012	- 736
	Macon	3,003	- 1,274	8,554	+ 4,277	2,366	- 1,911	9,372	+ 5,095
	Marshall	0	- 1,635	1,020	- 615	0	- 1,635	917	- 718
	Maury	68	- 4,944	3,953	- 1,059	0	- 5,012	3,599	- 1,413
	Meigs	335	- 411	541	- 205	316	- 430	522	- 224
	Monroe	1,585	- 1,407	2,359	- 633	1,515	- 1,477	2,289	- 703
	Montgomery	1,653	- 936	3,712	+ 1,123	1,466	- 1,123	3,525	+ 936
	Moore	0	- 972	341	- 631	0	- 972	278	- 694
	Overton	0	- 1,191	1,062	- 129	0	- 1,191	934	- 257
	Pickett	78	- 948	1,568	+ 542	0	- 1,026	1,432	+ 406
	Putnam	0	- 2,712	749	- 1,963	0	- 2,712	422	- 2,290
	Roane	527	- 600	814	- 313	501	- 626	788	- 339
	Robertson	2,251	- 401	4,455	+ 1,803	2,051	- 601	4,255	+ 1,603
	Sevier	2,244	- 2,044	3,266	- 1,022	2,151	- 2,137	3,173	- 1,115
	Smith	1,847	- 2,463	5,718	+ 1,408	1,495	- 2,815	5,366	+ 1,056
	Stewart	117	- 598	665	- 50	67	- 648	615	- 100

TABLE 15. (Continued)

State	T ₁₁ ^a		T ₁₂ ^b		T ₂₁ ^c		T ₂₂ ^d	
	EQQ ^e	G/L ^f	EQQ	G/L	EQQ	G/L	EQQ	G/L
Sullivan	2,626	- 1,827	3,882	- 571	2,512	- 1,941	3,768	- 685
Sumner	3,275	- 2,780	7,643	+ 1,588	2,878	- 3,177	7,246	+ 1,191
Trousdale	1,103	- 1,126	3,167	+ 938	916	- 1,313	2,979	+ 750
Unicoi	814	- 436	1,214	- 36	777	- 473	1,177	- 73
Union	1,513	- 504	2,129	+ 112	1,457	- 560	2,073	+ 56
Washington	4,142	- 1,564	6,054	+ 348	3,968	- 1,738	5,880	+ 174
White	0	- 2,077	603	- 1,474	0	- 2,077	357	- 1,720
Williamson	0	- 3,910	2,301	- 1,609	0	- 3,910	2,033	- 1,877
Wilson	0	- 2,901	1,707	- 1,194	0	- 2,901	1,508	- 1,393
VIRGINIA								
Grayson	604	- 407	739	- 272	576	- 435	739	- 272
Lee	4,024	- 995	4,735	- 284	3,882	- 1,137	4,735	- 284
Russell	3,402	- 232	3,982	+ 348	3,286	- 348	3,982	+ 348
Scott	4,635	- 1,161	5,464	- 332	4,469	- 1,327	5,464	- 332
Smyth	1,650	- 393	1,931	- 112	1,594	- 449	1,931	- 112
Washington	6,729	- 414	7,763	+ 620	6,523	- 620	7,763	+ 620

^aT₁₁ is the interstate transfer model constrained to 2Q_c with an equilibrium rental rate of 27 cents.

^bT₁₂ is the intrastate transfer model constrained to 2Q_c with equilibrium rental rates of 28 cents in Kentucky, 16 cents in Tennessee, and 22 cents in Virginia.

^cT₂₁ is the interstate transfer model constrained to 3Q_c with an equilibrium rental rate of 28 cents.

^dT₂₂ is the intrastate transfer model constrained to 3Q_c with equilibrium rental rates of 29 cents in Kentucky, 17 cents in Tennessee, and 22 cents in Virginia.

^eEQQ is Equilibrium Quantity of Quota in 1,000 pounds.

^fG/L is Gain (+) or Loss (-) in 1,000 pounds.

constraint was most obvious. In Model T_{11} , the equilibrium quantity of quota for Adair County was constrained to twice the observed quantity; however, in Model T_{21} , the equilibrium amount of quota exceeded by 854,000 pounds the equilibrium quantity in T_{11} , although it did not reach the larger constraint.

In Models T_{11} and T_{12} , 15 and 13 counties respectively reached the maximum quantity constraint of $2Q_c$, while only 5 and 3 counties respectively reached the maximum quantity constraint of $3Q_c$ in Models T_{21} and T_{22} .

At the estimated equilibrium position, 21 counties would export all of their quota in Model T_{11} , while 25 would export all their quota in Model T_{21} . The contrasts of counties exporting all their quota between Models T_{12} and T_{22} is even larger, 13 as compared to 19. These two differences resulted from counties maximum imports being larger based on the $3Q_c$ constraint and thus enabling other counties to have larger exports.

Another indication of the impact of the variation in total quantity constraints was the difference in equilibrium quota rates between T_{12} and T_{22} . In T_{12} with a constraint of $2Q_c$, the equilibrium quota rental rate per pound was 28 cents in Kentucky, 16 cents in Tennessee, and 22 cents in Virginia. In Model T_{22} , with a constraint of $3Q_c$, the equilibrium quota rental rate per pound was 29 cents in Kentucky, 17 cents in Tennessee, and 22 cents in Virginia. Models T_{11} and T_{21} showed the same relationship; the equilibrium quota rental rate per pound in T_{11} was 27 cents and in Model T_{21} , it was 28 cents. Obviously, the less restrictive the constraints on quota movement were, the higher the equilibrium quota rental rate would be.

Effects of Interstate and Intrastate Transfer

The other model variations, based on quota transfer rules, allowed either interstate transfer as incorporated in T_{11} and T_{21} or intrastate transfer only as incorporated in T_{12} and T_{22} .

When interstate transfer was compared with intrastate transfer, the equilibrium quota rental rates for Kentucky were one cent per pound lower and for Tennessee were eleven cents higher under both quantity constraints. Virginia had a five cent spread between T_{11} and T_{12} and a six cent spread between T_{21} and T_{22} .

Another obvious difference between interstate and intrastate transfer was in the number of counties that exported all of their quota. In Model T_{11} , with interstate transfer allowed, equilibrium conditions were such that 21 counties would export all of their burley quota compared with only 13 in Model T_{12} where only intrastate transfers were allowed. Models T_{21} and T_{22} showed a similar relationship with 25 and 19 respectively exporting all of their quotas.

In addition to the above counties that exported all of their quota, there were 10 counties in Models T_{11} and T_{12} and 13 counties in Models T_{21} and T_{22} left with less than 500,000 pounds of quota. Thus, an additional 23 to 38 of the 147 counties in the study would not qualify as substantial burley producers based on the 500,000 pound cut off level used for selecting the counties to include in the study area.

The largest individual quota transfer for a county was Henry County, Kentucky, where the maximum quantity constraint was reached in each model. In Models T_{21} and T_{22} , 20,196,000 pounds of tobacco were transferred into Henry County for a total of 30,294,000 pounds at equilibrium, the largest quota for any county.

When interstate transfer was allowed, the average quota rental rate per pound increased from a study area average of 22 cents to 27 cents in Model T_{11} and 28 cents in Model T_{21} . The equilibrium quota rental rates of 27 and 28 cents predicted in the two models were within the range of expected outcomes. Keller and Culver reported that the 1975 weighted average quota rental rate for the 147 county area was 25.6 cents per pound. They expected the equilibrium rental rate with cross county transfer to be close to that weighted average rental rate (Keller and Culver:18).

In Models T_{12} and T_{22} , only intrastate transfer was allowed; the Kentucky equilibrium quota rental rate per pound increased to 28 cents for Model T_{12} and 29 cents for Model T_{22} . This was an increase not only from the overall 1974 average of 22 cents for the study area and the Kentucky average of 26 cents, but also from the level with interstate transfer. In Tennessee, there was an increase from the 1974 per pound average of 14 cents to an equilibrium of 16 cents in Model T_{12} and 17 cents in Model T_{22} , but both were below the study average of 22 cents and the interstate equilibrium levels of 27 and 28 cents. Virginia showed an increase from the 1974 observed quota rental rate of 20 cents per pound to 22 cents for both models T_{12} and T_{22} .

Effects of Interstate Transfer Constrained to 3Q_e Compared to
1974 Observed Quota Distribution and Rental Rates

Data in Table 16 shows how the estimated equilibrium quota rental rates for the various counties using Model T_{21} differed from the 1974 observed quota rental rates. The largest increase in equilibrium rental rate per pound was Blount County, Tennessee, where the rate went from

TABLE 16. COMPARISON OF OBSERVED 1974 QUOTA RENTAL RATES AND EQUILIBRIUM QUOTA RENTAL RATES FROM MODEL T₂₁

<u>State</u>	Quota Rental Rate 1974 ^a	Quota Rental Rate Change ^a	<u>State</u>	Quota Rental Rate 1974 ^a	Quota Rental Rate Change ^a
County			County		
<u>Kentucky</u>			Harrison	27	+ 1
Adair	32	- 4	Hart	35	- 7
Allen	25	+ 3	Henderson	15	+13
Anderson	26	+ 2	Henry	35	- 7
Barren	35	- 7	Hopkins	13	+15
Bath	30	- 2	Jackson	30	- 2
Boone	25	+ 3	Jefferson	18	+10
Bourbon	30	- 2	Jessamine	25	+ 3
Boyle	27	+ 1	Johnson	15	+13
Bracken	30	- 2	Kenton	23	+ 5
Breathitt	18	+10	Knox	21	+ 7
Breckinridge	25	+ 3	Larue	35	- 7
Bullitt	15	+13	Laurel	27	+ 1
Butler	15	+13	Lawrence	15	+13
Caldwell	10	+18	Lee	25	+ 3
Campbell	25	+ 3	Lewis	30	- 2
Carroll	37	- 9	Lincoln	30	- 2
Carter	25	+ 3	Logan	25	+ 3
Casey	25	+ 3	Lyon	15	+13
Christian	20	+ 8	McLean	25	+ 3
Clark	25	+ 3	Madison	30	- 2
Clay	25	+ 3	Magoffin	22	+ 6
Clinton	31	- 3	Marion	35	- 7
Cumberland	25	+ 3	Mason	25	+ 3
Daviess	30	- 2	Meade	25	+ 3
Edmonson	20	+ 8	Menifee	30	- 2
Elliott	25	+ 3	Mercer	25	+ 3
Estill	25	+ 3	Metcalfe	30	- 2
Fayette	23	+ 5	Monroe	32	- 4
Fleming	40	-12	Montgomery	29	- 1
Franklin	25	+ 3	Morgan	26	+ 2
Gallatin	32	- 4	Muhlenberg	12	+16
Garrard	37	- 9	Nelson	30	- 2
Grant	25	+ 3	Nicholas	30	- 2
Grayson	30	- 2	Ohio	22	+ 6
Green	35	- 7	Oldham	17	+11
Greenup	25	+ 3	Owen	29	- 1
Hancock	30	- 2	Owsley	25	+ 3
Hardin	25	+ 3	Pendleton	21	+ 7

TABLE 16. (Continued)

<u>State</u>	Quota Rental Rate 1974 ^a	Quota Rental Rate Change ^a	<u>State</u>	Quota Rental Rate 1974 ^a	Quota Rental Rate Change ^a
County			County		
Powell	25	+ 3	Johnson	15	+13
Pulaski	30	- 2	Knox	10	+18
Robertson	25	+ 3	Lincoln	9	+19
Rockcastle	35	- 7	Loudon	8	+20
Rowan	28	0	McMinn	5	+23
Russell	25	+ 3	Macon	25	+ 3
Scott	25	+ 3	Marshall	10	+18
Shelby	30	- 2	Maurry	13	+15
Simpson	23	+ 5	Meigs	5	+23
Spencer	32	- 4	Monroe	7	+21
Taylor	35	- 7	Montgomery	22	+ 6
Todd	20	+ 8	Moore	6	+22
Trigg	22	+ 6	Overton	15	+13
Trimble	30	- 2	Pickett	20	+ 8
Warren	25	+ 3	Putnam	10	+18
Washington	35	- 7	Roane	4	+24
Wayne	30	- 2	Robertson	25	+ 3
Webster	12	+16	Sevier	5	+23
Wolfe	25	+ 3	Smith	20	+ 8
Woodford	25	+ 3	Stewart	15	+13
<u>Tennessee</u>			Sullivan	11	+17
Blount	2	+26	Sumner	20	+ 8
Campbell	10	+18	Trousdale	21	+ 7
Carter	10	+18	Unicoi	15	+13
Claiborne	25	+ 3	Union	18	+10
Clay	21	+ 7	Washington	18	+10
Cocke	13	+15	White	10	+18
DeKalb	10	+18	Williamson	10	+18
Giles	10	+18	Wilson	10	+18
Grainger	17	+11	<u>Virginia</u>		
Greene	20	+ 8	Grayson	12	+16
Hamblen	18	+10	Lee	20	+ 8
Hancock	25	+ 3	Russell	25	+ 3
Hawkins	20	+ 8	Scott	20	+ 8
Jackson	15	+13	Smyth	20	+ 8
Jefferson	18	+10	Washington	25	+ 3

^aThe observed 1974 quota rental rates and the difference between the observed 1974 quota rental rates and equilibrium quota rental rates estimated using Model T₂₁ are in cents per pound.

2 cents in 1974 to an estimated rate of 28 cents. The largest decrease in rental rate was 12 cents occurring in Fleming County, Kentucky. All of the declines in rental rate occurred in Kentucky, although over half (59 of 97) of the Kentucky counties showed increases in rental rate. In Tennessee and Virginia, all counties had increases in rental rates. Eight of the 44 Tennessee counties had increases of 20 cents per pound or more while the largest increase in Kentucky was 16 cents per pound.

The geographic distribution of gains and losses in quota for Model T₂₁ are shown in Figure 2. There were a total of 109 exporting counties: 59 in Kentucky, 44 in Tennessee, and 6 in Virginia. Only 37 counties were importers, all in Kentucky. One county showed no change. All but one of the 22 large exporters and importers (more than a 5 million pound quota change) were in Kentucky. In Tennessee, Maury County was estimated to export 5,012,000 pounds of quota. Not only were the largest gains and losses concentrated in Kentucky, but they were also concentrated in an area encompassing about one-third of the Kentucky study area. In Region 4, all counties except Oldham had either a gain or loss of more than 5 million pounds.

As shown in Figure 2, only 9 of the importing counties imported less than a million pounds of quota; 15 counties imported from one to five million pounds of quota and 13 counties imported more than 5 million pounds of quota. On the exporting side, 48 counties exported less than a million pounds of quota; 31 were in Kentucky, 13 in Tennessee, and 4 in Virginia. Another 52 counties exported between one and five million pounds of quota; 20 were in Kentucky, 30 in Tennessee, and 2 in Virginia. Only 9 counties exported more than five million

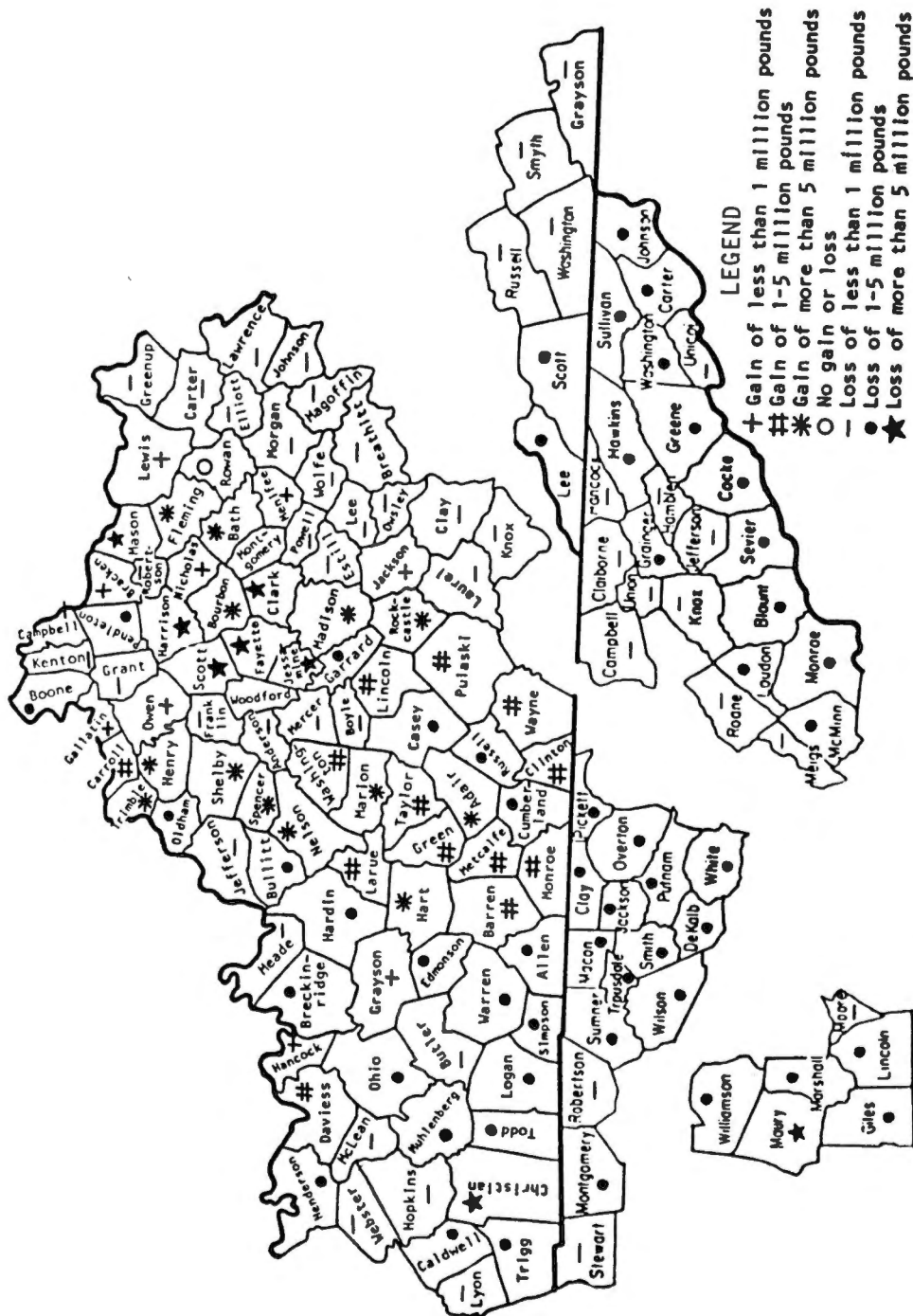


FIGURE 2. ESTIMATED DISTRIBUTION OF NET GAINS AND LOSSES OF BURLEY TOBACCO QUOTA AS PREDICTED WITH QUOTA LEASE AND TRANSFER MODEL T21

pounds of quota; 8 were in Kentucky and one was in Tennessee. One county, Rowan County, Kentucky, had no change in quota amount.

Regional and State Comparison of Results

Table 17 shows a breakdown of the results using Models T_{21} and T_{22} on a regional basis. Five regions were net exporters and four were net importers when interstate transfer was allowed. When only intrastate transfer was allowed, six regions were net exporters and only three regions were net importers.

Region 9, East Tennessee and Southwest Virginia, was the largest net exporting region with interstate transfer. But, when only intrastate transfer was allowed, Region 2, the Silt Loam Area of Tennessee and Kentucky, was the largest net exporter, in spite of the fact that the Tennessee portion of the region was a net importer.

Allowing quota to transfer across county lines made a major difference in the distribution of quota. With interstate transfer, quota moved into Kentucky from both Tennessee and Virginia and the counties that imported quota generally imported larger amounts. When intrastate quota transfer was allowed, some areas which had been exporters with interstate transfer became importers. The Tennessee portion of Region 2 was such an area. With interstate transfer, Region 2 was a net exporter of 6,862,000 pounds, but with the intrastate transfer restriction, the area became a net importer of 4,380,000 pounds.

With either intrastate or interstate transfer, burley production became more concentrated by allowing transfers across county lines. However, this concentration differed depending on whether quota was allowed to transfer across state lines. With interstate transfer, all

TABLE 17. ESTIMATED REGIONAL MOVEMENT OF BURLEY TOBACCO QUOTA ASSUMING PROGRAM CHANGES TO PERMIT INTRASTATE AND INTERSTATE TRANSFERS^a

Region	Equilibrium ^b Rental Rate		Total Export Counties		Total Import Counties		Net Quota Transfers ^c	
	T ₂₁	T ₂₂	T ₂₁	T ₂₂	T ₂₁	T ₂₂	T ₂₁	T ₂₂
Region 1	28	29	8	7	0	1	-20,455	- 6,632
Region 2	28	29	9	9	2	2	-13,795	-16,995
	28	17	5	1	0	4	- 6,862	4,380
Region 3	28	29	14	14	6	6	2,228	2,222
Region 4	28	29	9	9 ^d	12	11	51,929	11,057
Region 5	28	29	7	7 ^d	6	5	1,617	- 1,344
Region 6	28	29	4	5	8	7	20,664	8,663
Region 7	28	17	8	5	0	3	-14,974	- 527
Region 8	28	29	16 ^d	17	3	3	- 6,069	- 8,801
Region 9	28	17	23	14 ^d	0	8	-25,996	- 2,843
	28	22	6	4	0	2	- 4,316	- 32

^aEach county was constrained to no more than three times its 1974 observed quota.

^bEquilibrium rental rates are in cents per pound.

^cNet quota transfers are in 1,000 pounds. The sum of net transfers for all regions does not equal zero since equilibrium rental rates were determined only in whole cent intervals.

^dOne additional county in the region was neither a quota exporter or importer.

of the areas with increased concentration of quota were in Kentucky. With intrastate transfer, there were also areas of increased concentration in Tennessee, although there was little quota transfer between counties in Virginia.

Summary of Model Results

The results of the Quota Lease and Transfer Model showed that widespread transfer and increased concentration of quota could be expected if quota were allowed to transfer across county either interstate or intrastate. Production tended to become more concentrated in the traditionally heavy production counties and much less concentrated in those counties near population centers or with more accessibility to off-farm job opportunities. Of the counties around Lexington, Kentucky, for example, all but Bourbon County were net quota exporters. With interstate transfer, all counties around Knoxville, Tennessee, were net exporters, and with intrastate transfer, all but two of Knox's adjoining counties were net exporters with interstate transfer. Even with intrastate transfer, all but two of the adjoining counties in the Tri-Cities area were net exporters. These results tend to confirm the hypothesis that a major factor in the decisions of whether or not to produce tobacco was the availability of off-farm job opportunities.

Effects of Interstate and Intrastate Quota Transfers

On the Distribution of Program Benefits

The results of the Quota Lease and Transfer Models showed that there were net benefits available from allowing cross county transfer of quota, particularly if quota were allowed to transfer between states. There were also counties that would lose in total benefits under both

types of transfer. Exporting counties gain while importing counties lose.

County Distribution of Benefits

Table 18 shows a comparison of the geographic distribution of estimated quota owner benefits of the burley tobacco program as it was in 1974 and with interstate and intrastate transfer of quota allowed.

Barren County, Kentucky, had the largest total quota owner benefits of the program in 1974. But with both interstate and intrastate transfer, Fayette County, Kentucky, showed the largest benefit, followed closely by Woodford and five other Kentucky counties.

Bourbon County, Kentucky, had the highest average quota owner benefits in 1974, with \$2,804 per quota owner. But with both interstate and intrastate transfer of quota, Woodford County had the largest average quota owner benefit with \$3,058 and \$3,167 respectively.

In 1974, ten Kentucky counties had average quota owner benefits of \$2,000 or more. But with interstate transfer, only five Kentucky counties had average benefits of \$2,000 or more. By comparison, in 1974, the highest average quota owner benefit in Tennessee was \$495 for Macon County. But under interstate transfer, Trousdale County at \$984 had the largest Tennessee average quota owner benefit and six other Tennessee counties had average quota owner benefits of \$500 or more. Under intrastate transfer, Trousdale County still had the largest average quota owner benefit, but it was only \$598. In Virginia, Washington County had the highest average benefits under all three situations. All six Virginia counties fell in a small range from \$342 to \$510 benefits per quota owner under interstate transfer and \$269 to \$400 under intrastate transfer. In

TABLE 18. COUNTY COMPARISON OF 1974 ESTIMATED QUOTA OWNER BENEFITS WITH ESTIMATED BENEFITS UNDER INTERSTATE AND INTRASTATE LEASE AND TRANSFER OF QUOTA

State County	Average Quota Owner Benefits			Total Quota Owner Benefits ^a		
	1974	T ₂₁	T ₂₂	1974	T ₂₁	T ₂₂
Kentucky						
Adair	\$ 561	\$ 491	\$ 509	\$1,435	\$1,255	\$1,300
Allen	444	497	514	881	986	1,022
Anderson	903	972	1,007	1,007	1,084	1,123
Barren	1,234	987	1,023	4,227	3,382	3,502
Bath	1,639	1,530	1,584	1,831	1,709	1,770
Boone	570	638	661	883	989	1,024
Bourbon	2,804	2,617	2,710	3,574	3,336	3,455
Boyle	1,177	1,220	1,264	1,277	1,324	1,371
Bracken	2,141	1,998	2,069	2,166	2,022	2,094
Breathitt	254	395	409	259	403	418
Breckinridge	933	1,045	1,082	1,926	2,157	2,234
Bullitt	282	526	544	235	438	454
Butler	182	340	353	140	262	272
Caldwell	146	407	422	130	365	378
Campbell	451	505	523	232	260	270
Carroll	2,523	1,909	1,977	1,513	1,145	1,186
Carter	506	566	587	883	989	1,025
Casey	588	659	682	1,487	1,665	1,725
Christian	561	785	813	1,364	1,910	1,978
Clark	1,280	1,434	1,485	1,800	2,016	2,088
Clay	475	532	551	738	827	856
Clinton	483	436	452	721	651	675
Cumberland	573	641	664	653	731	758
Daviess	877	819	848	2,126	1,985	2,055
Edmonson	371	520	539	401	561	582
Elliott	514	575	596	573	642	665
Estill	481	538	557	440	492	510
Fayette	2,083	2,535	2,626	2,959	3,603	3,731
Fleming	1,785	1,249	1,294	3,020	2,114	2,189
Franklin	1,348	1,510	1,564	1,542	1,728	1,789
Gallatin	1,518	1,328	1,375	745	652	675
Garrard	2,099	1,589	1,645	2,836	2,146	2,223
Grant	1,135	1,271	1,316	1,738	1,947	2,016
Grayson	606	565	586	1,353	1,263	1,308
Green	1,139	911	944	2,010	1,608	1,665
Greenup	474	531	550	513	575	595
Hancock	839	783	811	690	644	667
Hardin	488	546	566	1,197	1,341	1,389
Harrison	1,792	1,858	1,924	2,766	2,869	2,971

TABLE 18. (Continued)

State County	Average Quota Owner Benefits			Total Quota Owner Benefits ^a		
	1974	T ₂₁	T ₂₂	1974	T ₂₁	T ₂₂
Hart	\$1,424	\$1,139	\$1,180	\$3,178	\$2,543	\$2,633
Henderson	250	467	484	177	331	343
Henry	2,477	1,982	2,052	3,534	2,828	2,929
Hopkins	1,186	400	414	75	162	168
Jackson	572	534	553	953	889	921
Jefferson	368	572	592	163	254	263
Jessamine	1,392	1,559	1,615	1,802	2,019	2,092
Johnson	203	378	392	147	274	283
Kenton	434	528	547	398	485	502
Knox	271	361	374	266	354	367
Larue	863	691	715	1,194	955	989
Laurel	450	467	484	1,274	1,321	1,269
Lawrence	190	355	368	141	264	274
Lee	290	324	336	177	198	206
Lewis	1,068	997	1,032	1,535	1,432	1,484
Lincoln	824	769	796	1,992	1,859	1,925
Logan	446	500	517	964	1,079	1,118
Lyon	214	400	414	77	144	149
McLean	374	419	434	385	432	447
Madison	1,637	1,528	1,582	3,432	3,204	3,318
Magoffin	306	390	404	422	537	557
Marion	1,386	1,109	1,148	1,914	1,531	1,585
Mason	2,009	2,250	2,330	2,345	2,626	2,720
Meade	414	464	480	470	526	545
Menifee	639	597	618	461	430	446
Mercer	1,176	1,317	1,364	1,861	2,084	2,159
Metcalfe	1,046	976	1,011	1,635	1,526	1,581
Monroe	657	575	595	1,197	1,048	1,085
Montgomery	1,570	1,516	1,570	1,895	1,830	1,895
Morgan	622	669	693	1,077	1,160	1,201
Muhlenberg	183	427	442	144	336	348
Nelson	920	859	890	1,433	1,337	1,385
Nicholas	2,010	1,876	1,943	1,769	1,651	1,710
Ohio	350	446	462	659	839	868
Oldham	573	944	977	327	539	558
Owen	1,932	1,866	1,932	2,537	2,450	2,537
Owsley	416	466	482	481	539	558
Pendleton	955	1,214	1,319	1,293	1,725	1,786
Powell	469	525	544	291	326	338
Pulaski	536	500	517	2,152	2,008	2,080
Robertson	1,575	1,763	1,826	691	774	802

TABLE 18. (Continued)

State County	Average Quota Owner Benefits			Total Quota Owner Benefits ^a		
	1974	T ₂₁	T ₂₂	1974	T ₂₁	T ₂₂
Rockcastle	\$ 802	\$ 642	\$ 665	\$1,174	\$ 929	\$ 972
Rowan	499	499	516	464	464	481
Russell	433	485	502	873	978	1,013
Scott	2,029	2,272	2,354	2,810	3,147	3,260
Shelby	1,919	1,791	1,855	3,794	3,541	3,668
Simpson	442	538	558	526	641	664
Spencer	1,786	1,563	1,618	1,456	1,274	1,319
Taylor	973	778	806	1,720	1,376	1,425
Todd	455	637	660	585	819	848
Trigg	477	607	629	410	522	541
Trimble	1,684	1,571	1,627	1,276	1,191	1,234
Warren	537	601	622	1,646	1,843	1,909
Washington	1,661	1,329	1,376	2,478	1,982	2,053
Wayne	503	469	486	935	873	904
Webster	171	400	414	56	131	135
Wolfe	554	620	642	530	594	615
Woodford	2,730	3,058	3,167	2,714	3,039	3,148
<u>Tennessee</u>						
Blount	29	405	246	656	656	398
Campbell	147	412	250	349	349	212
Carter	139	388	236	800	800	486
Claiborne	426	477	289	1,550	1,550	941
Clay	310	414	251	430	430	261
Cocke	203	436	265	1,063	1,063	645
DeKalb	141	395	240	643	643	390
Giles	131	367	223	379	379	230
Grainger	265	436	265	943	943	572
Greene	364	510	310	3,010	3,010	1,827
Hamblen	274	426	259	707	707	429
Hancock	427	478	290	769	769	467
Hawkins	306	428	260	1,676	1,676	1,018
Jackson	215	401	244	669	669	406
Jefferson	260	404	245	930	930	565
Johnson	217	405	246	812	812	493
Knox	136	380	231	653	654	397
Lincoln	121	375	228	520	520	316
Loudon	114	400	243	590	590	358
McMinn	68	379	230	769	769	467
Macon	495	555	337	1,198	1,198	727
Marshall	133	371	225	458	458	278
Mauzy	236	507	308	1,403	1,403	852
Meigs	59	331	201	209	209	127

TABLE 18. (Continued)

State County	Average Quota Owner Benefits			Total Quota Owner Benefits ^a		
	1974	T ₂₁	T ₂₂	1974	T ₂₁	T ₂₂
Monroe	\$ 95	\$ 378	\$ 230	\$ 838	\$ 838	\$ 509
Montgomery	350	445	270	725	725	440
Moore	94	438	266	272	272	165
Overton	164	307	186	334	334	203
Pickett	236	331	201	287	287	174
Putnam	128	358	218	759	759	461
Roane	54	377	229	316	316	192
Robertson	321	359	218	743	743	451
Sevier	76	427	259	214	1,201	729
Smith	486	681	413	862	1,207	733
Stewart	174	326	198	107	200	122
Sullivan	166	423	257	490	1,247	757
Sumner	396	555	337	1,211	1,695	1,029
Trousdale	738	984	598	468	624	379
Unicoi	222	414	252	188	350	213
Union	262	407	247	363	565	343
Washington	276	429	260	1,027	1,600	970
White	117	329	200	208	582	353
Williamson	203	568	345	391	1,095	665
Wilson	129	361	219	290	812	493
<u>Virginia</u>						
Grayson	147	342	269	121	283	223
Lee	326	456	358	1,004	1,405	1,104
Russell	435	487	383	908	1,017	799
Scott	313	438	344	1,159	1,623	1,275
Smyth	295	413	325	409	572	450
Washington	455	510	400	1,786	2,000	1,571

^aTotal quota owner benefits in thousand dollars.

both cases, benefits were higher than the observed range of \$147 to \$455.

Regional and State Distribution of Benefits

The benefit distribution for 1974 and for interstate and intrastate transfer under the $3Q_c$ maximum constraint rule are shown in Table 19. The total benefits were larger and the geographic distribution of those benefits was clearly different with both interstate and intrastate transfer from 1974 levels. Total program benefits for all U.S. producers increased from \$169.8 million to \$197.9 million for interstate transfer and to \$184.4 million for intrastate transfer. Interstate transfer increased the study area benefits from \$143.9 to \$167.8 million and intrastate transfer increased these benefits to \$156.4 million.

The geographic distribution of the increased benefits was rather uneven. Benefits to quota owners in Region 1 were almost doubled under interstate transfer as rental rate increased from the 1974 observed 15 cent level to the equilibrium rate of 28 cents per pound. With intrastate transfer, the benefit increase for Region 1 was small (\$3.3 million to \$3.7 million), because the increase in rental rate was only two cents, from 15 to 17. All of the regions with large percentage increases in benefits with interstate transfer were in Tennessee; the actual benefits also increased in a majority of the Kentucky counties. With intrastate transfer, most of the increased benefits would accrue to Kentucky counties.

Average quota owner benefits showed only minimal changes with intrastate transfer. All regions showed small percentage increases except Region 6 which showed a slight decrease. Average quota owner benefits

TABLE 19. COMPARISON OF ESTIMATED 1974 QUOTA OWNER BENEFITS AND ESTIMATED BENEFITS UNDER INTERSTATE AND INTRASTATE LEASE AND TRANSFER OF QUOTA^a

Area	1974										Model T21				Model T22			
	Percent		Total		Average		Total		Average		Percent		Quota		Percent		Quota	
	U.S.	Quota	Owner	Benefits ^b	of U.S.	Owner	Owner	Benefits ^b	Owner	Benefits ^b	of U.S.	Owner	Owner	Benefits ^b	of U.S.	Owner	Owner	Benefits ^b
Region 1	4.41	\$	3,293	1.94	\$	254	\$	6,146	3.11	\$	473	\$	3,732	2.02	\$	287		
			10,739 ^K				13,074 ^K						13,541 ^K					
			3,275 ^T				3,987 ^T						3,987 ^T					
Region 2	9.13		14,015	8.26		521	17,061			8.62		634	15,962	8.65		547		
Region 3	8.40		13,569	8.00		548	16,519			8.35		668	17,109	9.28		691		
Region 4	9.55		46,723	27.53		1,661	46,723			23.61		1,660	48,392	26.24		1,720		
Region 5	4.72		20,732	12.22		1,492	20,732			10.48		1,492	21,472	11.64		1,545		
Region 6	8.44		15,557	9.17		626	14,520			7.34		584	15,039	8.15		605		
Region 7	4.19		2,800	1.65		227	4,901			2.48		397	2,975	1.61		241		
Region 8	8.12		10,896	6.42		456	12,713			6.42		531	13,167	7.14		550		
			12,343 ^T				21,600 ^T						13,114 ^T					
			3,944				6,901						5,422					
Region 9	22.19		16,286	9.60		249	28,501			14.40		436	18,537	10.05		272		
Kentucky	45.64		118,217	69.67		879	124,281			62.80		924	128,719	69.79		957		
Tennessee	28.42		21,711	12.80		259	36,634			18.51		438	22,242	12.06		266		
Virginia	5.09		3,944	2.32		263	6,901			3.49		460	5,422	2.94		361		
Study Area	79.15		143,872	84.79		617	167,816			84.79		672	156,384	84.79		663		
United States	100.00		169,680*	100.00		476*	197,912*			100.00		672*	184,436*	100.00		663*		

^aEach county was constrained to no more than three times its 1974 observed quota.^bTotal quota owner benefits in thousand dollars.^KKentucky portion^VVirginia portion^TTennessee portion

*Projected

increased from \$879 to \$957 in Kentucky, from \$259 to \$266 in Tennessee, and from \$263 to \$361 in Virginia.

With interstate transfer, however, the average quota owner benefits changed rather drastically for some regions. The average quota owner benefits approximately doubled in Regions 1, 7, and the Tennessee portion of Region 9. In Regions 4 and 5, average quota owner benefits remained unchanged, while the remaining regions increased though not as drastically. The average benefit for Kentucky quota owners increased from \$879 to \$924, while the average benefit for Tennessee quota owners increased from \$259 to \$438. The average benefit for Virginia quota owners increased from \$263 to \$460. The average quota owner benefits in Tennessee and Virginia increased more with interstate transfer, while the average quota owner benefits in Kentucky increased more with intrastate transfer. Kentucky's proportion of total benefits was 69.7 percent under intrastate transfer and 62.8 percent under interstate transfer. Thus, while the benefits to Kentucky quota owners actually increased with interstate transfer, their benefits increased proportionately less than either Tennessee or Virginia quota owners.

Estimated Quota Transfer Benefits Compared to Other Study Results

If the results shown in this chapter are correct, they obviously are not perceived by Tennessee quota owners. Keller and McManus found through using data from the same Tennessee quota owners included in this study that only 5 percent of the sample of quota owners favored interstate transfer of quota (Keller and McManus:35).

Robinson concluded that farm price and income support programs influence the distribution of income among farmers, regions, and factors

of production (Robinson:1225-6). His analysis is supported by the findings of this study, particularly the evidence of the effect on income distribution, disparity of rental rates between counties, and the production shifts predicted by the Quota Lease and Transfer Model. The results of the Quota Lease and Transfer Model show that the program structure affects the geographic distribution of program benefits. With interstate transfer compared to the present program, Tennessee and Virginia quota owners had the largest gains. With intrastate transfer, however, Kentucky quota owners had the largest gains. The county, regional, and state benefits in both cases were different from the observed.

Results of the S-42 study suggested that under a free market, tobacco production would shift out of Kentucky and into Southwest Virginia and East Tennessee (Southern Cooperative Series Bulletin 162:90-1). The results of this study suggest a contrary conclusion. Estimates indicate that quota would move out of Tennessee and Virginia into Kentucky. These estimates did agree with the conclusions reached by Grise, Thompson, and Justus who suggested that production movements would be similar to those shown in this study (Grise, Thompson, and Justus:35-6).

CHAPTER 7

SUMMARY AND CONCLUSIONS

In 1971 it became possible to transfer burley tobacco on an annual lease basis from one farm to another within a county. This change has increased the total program benefits. These additional benefits occurred because the quota was allowed to transfer from higher to lower cost production units. Based on this occurrence, it was hypothesized that the removal of the restrictions on transfer of quota across county lines would contribute to a more efficient agricultural resource use and that, ultimately, the resulting benefits would accrue to producers at no additional cost to consumers and taxpayers.

The purpose of this study was to provide, through an examination of program benefits and their distribution, an economic analysis of program alternatives for the various groups and individuals participating in the tobacco policy process. Four specific objectives were outlined.

1. Determine the benefits of the present program for the study area.
2. Determine the distribution of burley quota and program benefits in the study area by county and, in the Tennessee counties, by income, age, and occupation groups.
3. Estimate burley quota demand functions for the study area.
4. Predict an equilibrium rental rate and distribution of burley quota and program benefits for the study area with intrastate and interstate transferability of quota based on the estimated quota demand functions.

The study area included the main portion of the burley tobacco belt and encompassed 147 Tennessee, Virginia, and Kentucky counties which produce approximately 85 percent of the U.S. burley crop. The area was also divided into nine separate geographic regions.

There were 233,198 quota owners in 1974, but not all produced tobacco. In that year, over 14 percent of the total quota base was transferred within counties. Producers in the study area represented a wide variety of farming situations ranging from part-time and semi-retired farmers to commercial operations. In 1974, burley contributed approximately 35 percent of the farm income in Kentucky, 10 percent in Tennessee and four percent in Virginia. In 1974, the cash receipts from burley tobacco were about \$650 million in the study area. The average production unit was approximately 1.5 acres.

Data for the study were obtained from a survey of almost 9,000 quota owners in the Tennessee portion of the study area, ASCS county executive directors for each county in the study area, and secondary sources.

Objective 1 Results

Quota takes on the capitalized value of the expected program benefits and was used to calculate program benefits. The total quota owner benefits from the burley tobacco program in the study area were estimated to be \$144 million for 1974, and the average quota owner benefits were estimated to be \$617.

For 1974, the estimated benefits were distributed among quota owners in various states as follows:

	<u>Average Quota Owner Benefits</u>	<u>Percent of Quota Holders</u>	<u>Percent of Production</u>	<u>Percent of Program Benefits</u>
Kentucky	\$879	45.6	62.8	69.7
Tennessee	259	28.4	18.5	12.8
Virginia	263	5.1	3.5	2.3

Objective 2 Results

Kentucky quota owners generally had larger quotas, higher quota rental rates, and larger benefits than those in either Tennessee or Virginia. The higher quota rental rates in Kentucky resulted in quota owners receiving a larger share of the benefits than their proportion of the quota.

The geographic concentration of benefits was also very evident on a regional basis. On a regional basis, the lowest estimated average quota owner benefits were in Region 9, East Tennessee and Virginia, at \$227. The highest average benefit was in Region 4, Inner and Outer Bluegrass Area, where the estimated average quota owner benefits were \$1,661. Average benefits per quota owner were more than twice as high in Kentucky's Regions 4 and 5 as in any other region. The average quota owner benefits were seven times as high in Region 4 as in Region 9.

A much more detailed examination of the program benefits distribution was possible in the Tennessee counties because of the additional survey information obtained for those counties. Data on quota owner age, occupation, farm income, and non-farm income were examined to determine the characteristics of the benefit recipients. On the basis of these sample data, the average quota owner was 56 years old and almost two-thirds of the quota owners were over 50 years of age. Only 28.3 percent of the quota owners considered themselves full-time farmers. The gross farm income of Tennessee quota owners was relatively low;

63 percent reported gross farm incomes of less than \$2,500. Over one-half reported non-farm incomes of less than \$5,000. In addition, quota owners with high gross farm incomes generally did not have high non-farm incomes and those with high non-farm incomes generally did not have high gross farm income.

Individual program benefits in Tennessee were mostly small; 90 percent of the quota owners received benefits of \$500 or less. Seven percent received benefits between \$500 and \$1,000, and 3 percent received benefits over \$1,000. Quota owners who received benefits of \$500 or less and had gross farm incomes of \$2,500 or less comprised 61 percent of the Tennessee quota owners studied. About one percent of the quota owners received benefits of \$1,000 or more and had gross farm incomes of \$10,000 or more. Almost half of the estimated program benefits to Tennessee quota owners accrued to those with gross farm income under \$2,500. Though small in dollars, benefits in many cases represented an important portion of income to the quota holder.

Burley program benefits were distributed rather evenly between age groups. The 64 percent of the quota owners over 50 years of age received 69 percent of the program benefits.

Among occupations, full-time farmers received a share of benefits disproportionate to their number. Full-time farmers represented 28 percent of the quota owners and received 36 percent of the benefits. Part-time farmers and full-time non-farmers received less than a proportionate share of the program benefits.

Benefits were shared somewhat unequally among both gross farm income groups and non-farm income groups. Only 10 percent of the quota owners had gross farm incomes of \$10,000 or more, and they

received 13 percent of the benefits. But the 32 percent of the quota owners with non-farm income of \$7,500 or more received only 27 percent of the program benefits.

Quota owners with under \$2,500 in gross farm income made up 63 percent of the quota owners but only received 47 percent of the benefits. Quota owners with zero non-farm income made up 18 percent of the sample and received 32 percent of the benefits. Thus, the small group of higher income farmers received slightly more than their proportionate share of benefits, while a larger group of quota owners with relatively high non-farm income received less than their proportionate share of program benefits. The larger group of quota owners with low farm income received less than their proportionate share of program benefits, while the smaller group of quota owners with no non-farm income received substantially more than their proportionate share of benefits.

Objective 3 Results

Quota rental rate was hypothesized to be a function of the quantity of quota, the previous year's tobacco price, farm wages, off-farm job opportunities, management, and county size. Three different quota demand models were estimated using linear regression analysis. The first model included dummy variables to account for differences in the demand for quota among nine specified regions. The second model included regional dummy variables to allow both slope and intercept differences in quota demand between the nine regions. In the third model, the quota demand relationship was estimated separately in all nine regions.

Models 1 and 2 explained 62 and 65 percent of the variation in quota demand. In Model 3, the correlation coefficient ranged from 72

to 30 percent. All three models generally gave the expected results in terms of direction and magnitude, although three of the equations in Model 3 had one variable with a sign different from that hypothesized. Overall the results of all three models were deemed usable for predictive purposes. Model 3 was chosen for further use because it was expected to provide the best estimates of the parameters, even though some of the equations had rather low R^2 's and few significant variables.

Objective 4 Results

The coefficients estimated in Model 3 were used in the Quota Lease and Transfer Model to simulate a burley quota lease and transfer market. This model was adapted from a model developed by Efstrataglou to simulate the flue-cured tobacco quota transfer market. Only minor modifications were necessary since the differences between the flue-cured and burley quota transfer markets were minimal. The Quota Lease and Transfer Model was then used to simulate the equilibrium distribution of burley quota under two quota transfer rules. One, quota was allowed to transfer across county lines within the state, intrastate. Two, quota was allowed to transfer across county and state lines within the study area, interstate. The results indicated that cross county quota lease and transfer would produce substantial shifts in burley production and that program benefits to quota owners would be substantially increased.

When interstate transfers were permitted, estimates from the equilibrium model indicated 109 exporting, 37 importing, and one no change counties. Every county in Regions 1 and 8 were exporters, while two-thirds of all counties in Region 4 were importers. The equilibrium

quota rental rate under interstate transfer was estimated to be 28 cents per pound, 6 cents above the average 1974 quota rental rate and 2 cents above the weighted 1974 average quota rental rate (Keller and Culver:16). With these transfers, burley production would become significantly more concentrated in Kentucky and less concentrated in Tennessee and Virginia. Production would tend to concentrate in traditionally heavy production areas and become sparser near population centers and areas with off-farm job opportunities.

Under the intrastate transfer simulation, equilibrium quota rental rates were also higher than observed average quota rental rates and concentration of production also increased. In the equilibrium situation, there were 92 exporting, 52 importing, and three no change counties. In no regions were all counties exporters, although in seven of the regions well over one-half of the counties were exporters. The equilibrium intrastate quota rental rates were one cent per pound higher in Kentucky than the estimated interstate equilibrium rate of 28 cents, 11 cents per pound lower in Tennessee, and six cents per pound lower in Virginia. Region 4 in Kentucky would have the largest increase in quota, but quota gains would be substantially below the levels with interstate transfer. Production would become more concentrated with intrastate transfer than under present limits of within county transfers, but less concentrated than with interstate transfers. With intrastate transfers, production became more concentrated in counties with average quota rental rate above the equilibrium for the state. Thus, there was some increased concentration in each state, although there was very little change in concentration in Virginia because the average county rental rates were very similar. With interstate transfer, the increased production

concentration was all in Kentucky, since all Tennessee and Virginia would export quota.

Under both simulations, net benefits of the program were increased due to a more economic distribution of tobacco production resources. However, there were those who gained and lost in each situation. Individuals who rented out quota gained in counties where the rental rate was below the predicted equilibrium level and lost in counties where the rental rate was above the predicted equilibrium level. Conversely, individuals who rented in quota gained where the quota rental rate was above the equilibrium level and lost where it was below the equilibrium level. Under both situations, all counties with an observed quota rental rate below the equilibrium had a net gain in benefits, while all with an observed quota rental rate above the equilibrium had a net loss in benefits. With interstate transfer, the 109 gaining counties far outnumbered the 37 losing counties. All counties in Tennessee and Virginia showed gains, while all of the losing counties were in Kentucky as was the one county with no change. Losses were generally much smaller than gains. With intrastate transfer, there were gains and losses in each of the three states, but the 92 counties with gains still outnumbered the 52 counties with losses and the three no change counties.

Producers as a group and society as a whole would gain because of a more economic distribution of resources. Resources in marginal tobacco production areas would shift from tobacco production to other alternatives as quota rental rates increased and quota was leased to producers in other areas. Resources in areas with high quota rental rates would move into tobacco production as rental rates declined.

Under the interstate transfer program, the observed average quota rental rate for the study area was projected to increase from 22 cents to 28 cents per pound. Under intrastate transfer, the observed average quota rental rate per pound was projected to increase from 26 cents to 29 cents in Kentucky, 20 cents to 22 cents in Virginia, and 14 cents to 17 cents in Tennessee. Using the quota rental rate as a measure of benefits, the benefits of the program would be increased by \$27.23 million per year with interstate transfer and \$14.76 million with intrastate transfer.

In addition to producing almost twice as many additional benefits as intrastate transfer, interstate transfer would produce a very different benefit distribution. The average program benefits per quota holder were projected as follows:

	<u>Interstate</u>	<u>Intrastate</u>	<u>Observed 1974</u>
Kentucky	\$924	\$957	\$879
Tennessee	438	266	259
Virginia	460	361	263

Substantial increases in benefits would result from allowing intrastate transfers; however, increases in benefits would be nearly doubled if the interstate transfers were allowed as well.

Overall Conclusions

The direct benefits of the present burley tobacco program accrue to the burley quota owners. Indirect benefits of the program were not examined in this study, but it would include benefits to local economies of higher and more stable tobacco income and gains to tobacco companies from increased stability of tobacco supply.

Total benefits of the tobacco program to quota holders were estimated at \$144 million for 1974. The average quota owner benefit was \$879 for Kentucky, \$259 for Tennessee, and \$263 for Virginia. This income supplement, while small, was important because many of the quota owners had very low incomes. In Tennessee, over half of the program benefits went to quota owners with under \$2,500 gross farm income in 1974. Almost 90 percent of the Tennessee quota owners received less than \$500 in benefits.

The tobacco control program also had costs which were not estimated in this study. The direct government cost of the tobacco program approaches zero, since the program depends upon supply control rather than subsidy payments to increase the price. A loan program is operated to obviate short-term low prices, but these loans are repaid so that over the long run, the program costs balance to essentially zero exclusive of administrative costs. Indirect governmental costs include both the costs of tobacco inspection and PL-480 export of tobacco.

The program also has costs in terms of consumer choices and resource utilization. First, consumers are forced to pay a higher price for tobacco products. Second, the program affects the product mix of the economy and resource allocations and, thus, the consumers' choice range.

Two program alternatives were considered, interstate and intrastate lease and transfer of quota. Other possible alternatives would include outright sale of quota, transfer of quota outside the burley belt, and removal of program controls and government supports. According to the estimates in this study, program benefits to quota holders would increase substantially if intrastate transfer of quota were allowed and particularly if interstate transfer were allowed. The distribution of production

would shift substantially, but the quota lease provides compensation for the shift. Quota rental rates would rise in exporting areas and fall in importing areas.

Allowing intrastate or interstate transfer would generate both gains and losses, although society as a whole and producers as a group would gain. The study showed that through changes in the lease and transfer provisions, it is possible to allow the movement of burley tobacco production to more efficient production areas while compensating owners of the quota. In addition, there would be indirect program beneficiaries who would be uncompensated since the economies of the areas experiencing declines in production, particularly local farm input suppliers, would lose business in quota exporting areas.

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TABLE A-1. DISTRIBUTION OF GROSS FARM INCOME BY AGE FOR BURLEY TOBACCO QUOTA OWNERS IN 44 SELECTED TENNESSEE COUNTIES, 1974

Gross Farm Income	Age Categories					Row Total Row Percent
	35 and Under	36 - 50	51 - 65	Over 65		
Less than \$2,500	Count	119	313	453	354	1239
	Row Percent	9.9	25.3	36.3	28.5	
	Column Percent	63.6	57.4	58.8	74.6	
	Total Percent	6.0	15.8	22.9	17.9	62.6
\$2,500 - \$4,999	Count	29	94	146	69	338
	Row Percent	8.6	27.9	43.1	20.4	
	Column Percent	15.5	17.2	18.9	14.6	
	Total Percent	1.5	4.8	7.4	3.5	17.1
\$5,000 - \$9,999	Count	25	70	87	29	212
	Row Percent	11.8	33.2	41.3	13.7	
	Column Percent	13.4	12.9	11.3	6.1	
	Total Percent	1.3	3.6	4.4	1.5	10.7
\$10,000 - \$19,999	Count	6	40	44	9	99
	Row Percent	6.0	40.5	44.3	9.2	
	Column Percent	3.2	7.3	5.7	1.9	
	Total Percent	0.3	2.0	2.2	0.5	5.0
\$20,000 - \$39,999	Count	3	15	20	5	43
	Row Percent	7.0	34.7	46.7	11.6	
	Column Percent	1.6	2.7	2.6	1.1	
	Total Percent	0.2	0.8	1.0	0.3	2.2
\$40,000 and Over	Count	5	13	21	8	47
	Row Percent	10.6	27.7	44.7	17.1	
	Column Percent	2.7	2.4	2.7	1.7	
	Total Percent	0.3	0.7	1.1	0.4	2.4
Column Total		187	546	771	474	1977
Column Percent		9.4	27.6	39.0	24.0	

TABLE A-2. DISTRIBUTION OF GROSS FARM INCOME BY NON-FARM INCOME FOR BURLEY TOBACCO QUOTA OWNERS IN 44 SELECTED TENNESSEE COUNTIES, 1974

Gross Farm Income	Non-Farm Income Categories										Row Total
	None	Under	\$2500-	\$4999	\$5000-	\$7499	\$9999	\$10000-	Over	Row Total	
		\$2500	\$4999	\$5000-	\$7499	\$9999	\$10000-	\$15000			
Less than \$2,500	Count	174	353	129	148	112	150	93	1159		
	Row Percent	15.0	30.4	11.2	12.8	9.7	13.0	8.0			
	Column Percent	51.9	72.2	59.7	66.6	61.9	62.8	50.9			
	Total Percent	9.3	18.9	6.9	7.9	6.0	8.1	5.0	62.2		
\$2,500 - \$4,999	Count	54	74	45	36	33	46	29	317		
	Row Percent	17.0	23.3	14.2	11.4	10.4	14.5	9.2			
	Column Percent	16.1	15.1	20.8	16.2	18.2	19.2	15.9			
	Total Percent	2.9	4.0	2.4	1.9	1.8	2.5	1.6	17.0		
\$5,000 - \$9,999	Count	43	33	30	24	23	27	25	206		
	Row Percent	20.9	16.2	14.7	11.7	11.2	13.1	12.3			
	Column Percent	12.8	6.8	13.9	10.8	12.7	11.3	13.9			
	Total Percent	2.3	1.8	1.6	1.3	1.2	1.4	1.4	11.0		
\$10,000 - \$19,999	Count	33	16	6	11	5	7	17	95		
	Row Percent	34.7	16.7	6.4	11.7	5.2	7.4	17.9			
	Column Percent	9.9	3.3	2.8	5.0	2.8	2.9	9.3			
	Total Percent	1.8	0.9	0.3	0.6	0.3	0.4	0.9	5.1		
\$20,000 - \$39,999	Count	13	6	4	2	6	6	7	44		
	Row Percent	29.3	13.7	9.2	4.5	13.5	13.6	16.2			
	Column Percent	3.9	1.2	1.9	0.9	3.3	2.5	3.9			
	Total Percent	0.7	0.3	0.2	0.1	0.3	0.3	0.4	2.4		
\$40,000 and Over	Count	18	7	2	1	2	3	11	44		
	Row Percent	40.9	15.9	4.5	2.3	4.5	6.8	25.1			
	Column Percent	5.4	1.4	0.9	0.4	1.1	1.2	6.0			
	Total Percent	1.0	0.4	0.1	0.1	0.1	0.2	0.6	2.4		
Column Total		335	489	217	222	181	239	182	1864		
Column Percent		17.9	26.2	11.6	11.9	9.7	12.8	9.8			

TABLE A-3. DISTRIBUTION OF GROSS FARM INCOME BY OCCUPATION FOR BURLEY TOBACCO QUOTA OWNERS IN 44 SELECTED TENNESSEE COUNTIES, 1974

Gross Farm Income	Occupational Categories					
	Full-Time		Part-Time		Full-Time	
	Farmer	Farmer	Farmer	Non-Farm	Other	Row Total
Count	219	548	153	138	1238	
Row Percent	17.7	44.2	12.4	25.7		
Column Percent	39.0	66.1	78.0	79.7		
Total Percent	11.0	27.6	7.7	16.0	62.4	
Count	111	159	24	45	339	
Row Percent	32.7	46.9	7.1	13.3		
Column Percent	19.8	19.2	12.2	11.3		
Total Percent	5.6	8.0	1.2	2.3	17.1	
Count	104	80	9	22	216	
Row Percent	48.3	37.2	4.2	10.2		
Column Percent	18.6	9.7	4.7	5.5		
Total Percent	5.3	4.0	0.5	1.1	10.9	
Count	62	27	4	7	100	
Row Percent	61.9	27.1	4.1	6.9		
Column Percent	11.1	3.3	2.1	1.7		
Total Percent	3.1	1.4	0.2	0.3	5.0	
Count	28	8	3	5	44	
Row Percent	63.5	18.3	6.8	11.4		
Column Percent	5.0	1.0	1.5	1.3		
Total Percent	1.4	0.4	0.2	0.3	2.2	
Count	37	6	3	2	48	
Row Percent	77.0	12.4	6.3	4.3		
Column Percent	6.6	0.7	1.5	0.5		
Total Percent	1.9	0.3	0.2	0.1	2.4	
Column Total	561	828	196	399	1984	
Column Percent	28.3	41.7	9.9	20.1		

TABLE A-4. DISTRIBUTION OF NON-FARM INCOME BY OCCUPATION FOR BURLEY TOBACCO QUOTA OWNERS IN 44 SELECTED TENNESSEE COUNTIES, 1974

Non-Farm Income	Occupational Categories					Row Total Row Percent
	Full-Time Farmers	Part-Time Farmers	Full-Time Non-Farm	All Other		
0	Count	230	22	17	81	349
	Row Percent	65.8	6.3	4.8	23.1	
	Column Percent	43.6	2.7	8.4	21.4	
	Total Percent	12.0	1.1	0.9	4.2	18.2
Less than \$2,500	Count	194	111	31	159	495
	Row Percent	39.1	22.4	6.3	32.2	
	Column Percent	36.8	13.6	15.5	42.4	
	Total Percent	10.1	5.8	1.6	8.3	25.8
\$2,500 - \$4,999	Count	45	121	17	43	226
	Row Percent	19.9	53.5	7.6	19.0	
	Column Percent	8.6	14.8	8.6	11.4	
	Total Percent	2.3	6.3	0.9	2.2	11.8
\$5,000 - \$7,499	Count	22	148	25	32	227
	Row Percent	9.7	65.3	11.0	14.0	
	Column Percent	4.2	18.1	12.5	8.5	
	Total Percent	1.1	7.7	1.3	1.7	11.8
\$7,500 - \$9,999	Count	17	129	19	17	182
	Row Percent	9.3	70.9	10.4	9.4	
	Column Percent	3.2	15.8	9.4	4.5	
	Total Percent	0.9	6.7	1.0	0.9	9.5
\$10,000 - \$14,999	Count	11	180	36	23	250
	Row Percent	4.4	72.1	14.3	9.2	
	Column Percent	2.1	22.1	17.8	6.1	
	Total Percent	0.6	9.4	1.9	1.2	13.0
Over \$15,000	Count	8	106	56	21	191
	Row Percent	4.2	55.4	29.3	11.1	
	Column Percent	1.5	13.0	27.9	5.6	
	Total Percent	0.4	5.5	2.9	1.1	10.0
Column Total		527	818	201	376	1922
Column Percent		27.4	42.6	10.5	19.6	

TABLE A-5. DISTRIBUTION OF NON-FARM INCOME BY AGE FOR BURLEY TOBACCO QUOTA OWNERS IN 44 SELECTED TENNESSEE COUNTIES, 1974

Non-Farm Income	Age Categories					Row Total Row Percent
	Under 35	36 - 50	51 - 65	Over 65		
	Count	Row Percent	Column Percent	Total Percent		
0	Count	14	74	144	117	348
	Row Percent	4.0	21.2	41.3	33.5	
	Column Percent	7.3	13.6	19.5	26.7	
	Total Percent	0.7	3.9	7.5	6.1	18.3
Less than \$2,500	Count	21	86	181	205	493
	Row Percent	4.3	17.5	36.7	41.5	
	Column Percent	11.0	15.8	24.5	46.9	
	Total Percent	1.1	4.5	9.5	10.7	25.8
\$2,500 - \$4,999	Count	21	58	100	47	227
	Row Percent	9.3	25.6	44.3	20.8	
	Column Percent	11.0	10.7	13.6	10.8	
	Total Percent	1.1	3.0	5.3	2.5	11.9
\$5,000 - \$7,499	Count	33	72	94	27	226
	Row Percent	14.6	31.9	41.6	11.9	
	Column Percent	17.2	13.3	12.8	6.2	
	Total Percent	1.7	3.8	4.9	1.4	11.8
\$7,500 - \$9,999	Count	34	68	69	11	182
	Row Percent	18.7	37.3	37.9	6.1	
	Column Percent	17.8	12.5	9.4	2.5	
	Total Percent	1.8	3.6	3.6	0.6	9.5
\$10,000 - \$14,999	Count	45	109	82	12	247
	Row Percent	18.1	44.0	33.0	4.9	
	Column Percent	23.3	20.0	11.1	2.7	
	Total Percent	2.3	5.7	4.3	0.6	12.9
Over \$15,000	Count	24	77	67	18	186
	Row Percent	12.8	41.4	36.0	9.7	
	Column Percent	12.5	14.2	9.1	4.2	
	Total Percent	1.3	4.0	3.5	1.0	7.8
Column Total		192	544	737	437	1909
Column Percent		10.0	28.5	38.6	22.9	

TABLE A-6. DETAILED DISTRIBUTION OF BENEFITS FOR BURLEY TOBACCO QUOTA OWNERS BY AGE IN 44 SELECTED TENNESSEE COUNTIES, 1974

Benefits	Age Categories					Row Total Row Percent
	35 and Under	36 - 50	51 - 65	Over 65		
\$0 - \$250	Count	145	419	546	360	1470
	Row Percent	9.9	28.5	37.1	24.5	
	Column Percent	71.1	72.6	64.5	65.2	
	Total Percent	6.7	19.2	25.0	16.5	67.4
\$251 - \$500	Count	42	99	202	141	484
	Row Percent	8.7	20.5	41.7	29.1	
	Column Percent	20.6	17.2	23.8	25.5	
	Total Percent	1.9	4.5	9.3	6.5	22.2
\$501 - \$750	Count	12	27	48	25	112
	Row Percent	10.7	24.1	42.9	22.3	
	Column Percent	5.9	4.7	5.7	4.5	
	Total Percent	0.6	1.2	2.2	1.1	5.1
\$751 - \$1,000	Count	3	15	22	11	51
	Row Percent	5.9	29.4	43.1	21.6	
	Column Percent	1.5	2.6	2.6	2.0	
	Total Percent	0.1	0.7	1.0	0.5	2.3
\$1,001 - \$1,250	Count	1	13	13	6	33
	Row Percent	3.0	39.4	39.4	18.2	
	Column Percent	0.5	2.3	1.5	1.1	
	Total Percent	0.0	0.6	0.6	0.3	1.5
\$1,251 - \$1,500	Count	0	1	7	1	9
	Row Percent	0.0	11.1	77.8	11.1	
	Column Percent	0.0	0.2	0.8	0.2	
	Total Percent	0.0	0.0	0.3	0.0	0.4
\$1,501 and Over	Count	1	3	9	8	21
	Row Percent	4.8	14.3	42.9	38.1	
	Column Percent	0.5	0.5	1.1	1.4	
	Total Percent	0.0	0.1	0.4	0.4	1.0
Column Total		204	577	847	552	2180
Column Percent		9.4	26.5	38.9	25.3	

TABLE A-7. DETAILED DISTRIBUTION OF BENEFITS FOR BURLEY TOBACCO QUOTA OWNERS BY OCCUPATION IN 44 SELECTED TENNESSEE COUNTIES, 1974

Benefits	Occupational Categories					Row Total Row Percent
	Full-Time Farmer	Part-Time Farmer	Full-Time Non-Farm	All Other		
\$0 - \$250	Count	326	642	174	313	1457
	Row Percent	22.4	44.1	12.0	21.5	
	Column Percent	54.1	73.7	76.0	69.7	
	Total Percent	15.1	29.8	8.1	14.5	67.6
\$251 - \$500	Count	166	169	40	96	471
	Row Percent	35.2	35.9	8.5	20.4	
	Column Percent	27.5	19.4	17.5	21.4	
	Total Percent	7.7	7.8	1.9	4.5	21.9
\$501 - \$750	Count	52	29	7	23	111
	Row Percent	46.8	26.1	6.3	20.7	
	Column Percent	8.6	3.3	3.1	5.1	
	Total Percent	2.4	1.3	0.3	1.1	5.2
\$751 - \$1,000	Count	29	12	4	6	51
	Row Percent	56.9	23.5	7.8	11.8	
	Column Percent	4.8	1.4	1.7	1.3	
	Total Percent	1.3	0.6	0.2	0.3	2.4
\$1,001 - \$1,250	Count	14	14	3	1	32
	Row Percent	43.8	43.8	9.4	3.1	
	Column Percent	2.3	1.6	1.3	0.2	
	Total Percent	0.7	0.7	0.1	0.0	1.5
\$1,251 - \$1,500	Count	7	1	0	3	11
	Row Percent	63.6	9.1	0.0	27.3	
	Column Percent	1.2	0.1	0.0	0.7	
	Total Percent	0.3	0.0	0.0	0.1	0.5
\$1,501 and Over	Count	9	4	1	7	21
	Row Percent	42.9	19.0	4.8	33.3	
	Column Percent	1.5	0.5	0.4	1.6	
	Total Percent	0.4	0.2	0.0	0.3	1.0
Column Total	603	871	229	449	2153	
Column Percent	28.0	40.5	10.6	20.9		

TABLE A-8. DETAILED DISTRIBUTION OF BENEFITS FOR BURLEY TOBACCO QUOTA OWNERS BY GROSS FARM INCOME IN 44 SELECTED TENNESSEE COUNTIES, 1974

Benefits	Gross Farm Income Categories										Row Total
	Under \$2,500	\$2,500-\$4,999	\$5,000-\$9,999	\$10,000-\$19,999	\$20,000-\$39,999	Over \$39,999	Over \$39,999	Over \$39,999	Over \$39,999	Over \$39,999	
\$0 - \$250	Count	971	192	92	43	21	20	20	20	1339	
	Row Percent	72.5	14.3	6.9	3.2	1.6	1.5	1.5	1.5		
	Column Percent	76.4	56.3	42.6	43.0	47.7	41.7	41.7	41.7		
	Total Percent	48.1	9.5	4.6	2.1	1.0	1.0	1.0	1.0	66.3	
\$251 - \$500	Count	254	99	71	20	8	12	12	12	464	
	Row Percent	54.7	21.3	15.3	4.3	1.7	2.6	2.6	2.6		
	Column Percent	20.0	29.0	32.9	20.0	18.2	25.0	25.0	25.0		
	Total Percent	12.6	4.9	3.5	1.0	0.4	0.6	0.6	0.6	23.0	
\$501 - \$750	Count	34	30	16	19	4	4	4	4	107	
	Row Percent	31.8	28.0	15.0	17.8	3.7	3.7	3.7	3.7		
	Column Percent	2.7	8.8	7.4	19.0	9.1	8.3	8.3	8.3		
	Total Percent	1.7	1.5	0.8	0.9	0.2	0.2	0.2	0.2	5.3	
\$751 - \$1000	Count	8	12	17	5	3	4	4	4	49	
	Row Percent	16.3	24.5	34.7	10.2	6.1	8.2	8.2	8.2		
	Column Percent	0.6	3.5	7.9	5.0	6.8	8.3	8.3	8.3		
	Total Percent	0.4	0.6	0.8	0.2	0.1	0.2	0.2	0.2	2.4	
\$1001 - \$1250	Count	2	5	11	8	3	3	3	3	32	
	Row Percent	6.3	15.6	34.4	25.0	9.4	9.4	9.4	9.4		
	Column Percent	0.2	1.5	5.1	8.0	6.8	6.3	6.3	6.3		
	Total Percent	0.1	0.2	0.5	0.4	0.1	0.1	0.1	0.1	1.6	
\$1251 - \$1500	Count	1	3	3	2	1	0	0	0	10	
	Row Percent	10.0	30.0	30.0	20.0	10.0	0.0	0.0	0.0		
	Column Percent	0.1	0.9	1.4	2.0	2.3	0.0	0.0	0.0		
	Total Percent	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.5	
\$1501 and Over	Count	1	0	6	3	4	5	5	5	19	
	Row Percent	5.3	0.0	31.6	15.8	21.1	26.3	26.3	26.3		
	Column Percent	0.1	0.0	2.8	3.0	9.1	10.4	10.4	10.4		
	Total Percent	0.0	0.0	0.3	0.1	0.2	0.2	0.2	0.2	0.9	
Column Total		1271	341	216	100	44	48	48	48	2020	
Column Percent		62.9	16.9	10.7	5.0	2.2	2.4	2.4	2.4		

TABLE A-9. DETAILED DISTRIBUTION OF BENEFITS FOR BURLEY TOBACCO QUOTA OWNERS BY NON-FARM INCOME IN 44 SELECTED TENNESSEE COUNTIES, 1974

Benefits	Non-Farm Income Categories											
	Under \$2,500		\$2,500-\$4,999		\$4,999-\$7,499		\$7,499-\$9,999		\$9,999-\$14,999		\$14,999-\$15,000	
	None	Count	Count	Row Percent	Count	Row Percent	Count	Row Percent	Count	Row Percent	Count	Row Percent
\$0 - \$250	216	332	154	11.7	156	11.9	133	10.1	193	14.7	127	9.7
	16.5	25.3	67.5	60.5	68.4	72.7	76.9	65.8				
	60.5	65.4										
	11.1	17.0	7.9	8.0	6.8	9.9	6.5	67.3				
\$251 - \$500	88	122	52	12.1	56	13.1	38	8.9	39	9.1	33	7.7
	20.6	28.5	22.8	24.6	24.6	20.8	15.5	17.1				
	24.6	24.0										
	4.5	6.3	2.7	2.9	2.0	2.0	1.7	22.0				
\$501 - \$750	26	29	13	13.0	7	7.0	8	11	6	6.0	11	10.0
	26.0	29.0	5.7	5.7	3.1	4.4	5.7	5.7				
	7.3	5.7	1.3	1.5	0.4	0.4	0.3	0.6				
	1.3	1.5	0.7	0.7	0.4	0.4	0.3	0.6				
\$751 - \$1000	13	14	4	8.5	4.3	0.9	0	8	6	12.8	17.0	47
	27.7	29.8	1.8	1.8	0.9	0.0	0.0	4.1				
	3.6	2.8	0.2	0.2	0.1	0.1	0.0	0.4				
	0.7	0.7	0.1	0.1	0.1	0.1	0.0	0.4				
\$1001 - \$1250	8	4	1	3.3	13.3	10.0	3	5	5	16.7	16.7	30
	26.7	13.3	0.4	0.4	1.8	1.6	0.2	2.6				
	2.2	0.8	0.1	0.1	0.2	0.2	0.3	0.3				
	0.4	0.2	0.1	0.1	0.2	0.2	0.3	0.3				
\$1251 - \$1500	1	6	0	0.0	2	18.2	0	1	1	9.1	9.1	11
	9.1	54.5	0.0	0.0	18.2	0.9	0.0	0.5				
	0.3	1.2	0.0	0.0	0.9	0.1	0.0	0.1				
	0.1	0.3	0.0	0.0	0.1	0.1	0.0	0.1				
\$1501 and Over	5	1	4	19.0	4.8	4.8	1	8	1	4.8	38.1	21
	23.8	4.8	1.8	1.8	0.4	0.5	0.4	4.1				
	1.4	0.2	0.2	0.2	0.1	0.1	0.1	0.4				
	0.3	0.1	0.2	0.2	0.1	0.1	0.1	0.4				
Column Total		357	508	228	228	183	251	193	1948			
Column Percent		18.3	26.1	11.7	11.7	9.4	12.9	9.9				

VITA

James Andrew Culver was born on March 19, 1946, in Martin, Tennessee. He attended public schools in Dresden, Tennessee, and graduated from Dresden High School in 1964. The following September he entered the University of Tennessee at Martin, and in June, 1968, he received a Bachelor of Science degree in General Agriculture.

A two-year tour in the United States Navy followed for Ensign Culver. He has maintained his Naval standing through Naval Reserve duty and is currently serving as a Lieutenant in the Reserves.

In the summer of 1970, he accepted a research assistantship at the University of Tennessee at Knoxville in Agricultural Economics. He received his Master's degree in June, 1972, and began work on his Ph.D. In May, 1975, he began his career as Staff Consultant on the U.S. House of Representatives Subcommittee on Dairy and Poultry. Since October, 1976, he has been the Staff Economist for the Agriculture Committee of the U.S. House of Representatives.

He received the Doctor of Philosophy degree with a major in Agricultural Economics in March, 1978. He is a member of the American Agricultural Economics Association, Southern Agricultural Economics Association, Gamma Sigma Delta, and Alpha Gamma Rho.

He is married to the former Nancy Margaret Neese of Martin, Tennessee. They have two children, David Andrew and Emily Claire.