Introduction

This preliminary survey of my research in tobacco prices describes the work just as far as it had been done at the end of my temporary stay in the United States.

Though there is not even one part of it that is really completed I decided to use this opportunity to give it a limited distribution as a Cowles Commission discussion paper, partly also because this was a way to give all those, whose help and interest I experienced, some idea of what this study is going to be.

From this place I would like to tell all those persons, with whom I could discuss part of this work already earlier, or who helped me in any other way, how much I appreciated this. Additional criticisms or suggestions that you might have will be welcomed.

Hendriks Ooris
AN INVESTIGATION INTO SOME PRICE-DETERMINING FACTORS IN AMERICAN LEAF TOBACCO MARKETS

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I. SOME GENERAL NOTES ON TOBACCO PRODUCTION AND DISTRIBUTION IN THE UNITED STATES

1. In many countries tobacco is an important commodity from the standpoint of agriculture, trade and industry, as a source of revenue for government, and in nearly every country the consumption of tobacco products is considered nowadays to be one of the basic needs of a considerable part of the population. This is particularly true for the U.S.A. The importance of tobacco growing in U.S. agricultural production may be shown by the facts that growers received $1050 million for their 1950 tobacco crop, which made this crop, from the standpoint of commercial value, rank fourth among the field crops. Leaf tobacco exports in that year were valued at $250 million, and total revenue derived from direct Federal and State tobacco taxes during the 1950/51 fiscal year exceeded $1800 million.

2. U.S. production of leaf tobacco is the main source of supply for domestic consumption. In 1949/50, e.g., only about 7% of domestic consumption was imported. About two-thirds of the imported leaf tobacco was of the so-called oriental types, coming from South Eastern Europe.
and the Near East. These types had to be imported because their peculiar flavor, which is very different from the flavor of the U.S. types, is considered an almost indispensable element in some of the most popular blends of cigarettes in this country. Besides the oriental types some cigar leaf tobacco from Latin America was imported.

3 The U.S.A. is also the chief supplier on the world market of leaf tobacco for tobacco importing countries, providing about 40% of world exports of this raw material and even more than 60% of world production of the so-called flue-cured types, which are particularly important in cigarette production.

4 Most of the American tobaccos have been sold during the last decades at local loose leaf auction markets, where the sales were made at privately-owned warehouses to the highest bidder. Besides these a so-called "closed-bid auction" hogshead market (formerly the most prevalent type in most growing areas) is still in operation in Maryland. The researches which are described in this paper were carried out to understand better what factors ultimately did determine the prices on all those markets and to describe, if possible, the way in which those factors worked in one or more econometric models.

5 Tobacco farming in the United States is highly specialised. Tobaccos form a group of crops rather than one, each crop having distinctive uses and distinctive markets.

In government statistics and support legislation the main basis for classification is provided by the method of curing, except for the cigar types. They distinguish a flue-cured, a fire-cured, an air-cured and sometimes a sun-cured tobacco class. Each class contains again two
or more types which differ in character and quality as a result of different soils, biological strain and cultural methods. For purposes of price support, the government sub-divides the so-called air-cured class into Burley, Maryland and dark air-cured types.

The government classification, including the last sub-division, could very well be used for our purposes, too. For then we have to do with five or six classes and sub-classes, within each of which the prices of the different types were always highly correlated with each other, while the average prices over the different classes moved more independently of each other.

As, however, this independency was not complete and, moreover, from an economic point of view, the classes could be considered to have some important features in common, it was considered profitable to study each of them more or less along with the others. Cigar tobacco types, however, were left out.

Tobacco is a one-year crop and an important cash crop for a very great number of relatively small farmers. It is one of the most intensive annual farm crops in the U.S.A.; to obtain a leaf of reasonable quality the farmers are required to devote much of their time and skill to this crop throughout the whole physical production process first and further in the preparation of the tobacco for the market. As the leaf, as far as it can be prepared on the farm, is a perishable commodity almost all the production is sold at the auctions in the year of harvesting. Therefore, the supply of leaf tobacco, in the short run, could be considered inelastic and highly competitive until 1933. From 1933, however, acreage, production and/or marketing controls were so important in most years that they considerably changed the nature of supply.
The Agricultural Adjustment Acts of 1933 and 1938 provided for most of the years since 1934 for the setting of national production quotas which are proclaimed by the government but subject to ratification of a qualified majority of the growers.

Tobacco buying and manufacturing, in contrast with the supply of the tobacco leaf by the agricultural producers, shows in all sectors a high degree of concentration. For the production of cigarettes this has been so even before the time when the industry was mechanized. From 1890 to 1910 practically the whole tobacco products industry, except the cigar industry, became united in one big trust, the American Tobacco Company and its subsidiaries or the so-called "Tobacco Trust". This trust, however, was dissolved by law in November 1911 and from that time the industry had no more a monopolistic, but an oligopolistic character. In 1949 three companies sold 77.8% of all cigarettes in the U.S.A. and in 1947 eight companies made a little over 80% of all snuff, chewing and smoking tobacco.

Purchases on the leaf markets were during the last decades mainly made by six major buying companies. Three of these are the three biggest cigarette producers in the U.S.A.: the American Tobacco Company, Reynolds, and Liggett and Myers. The fourth is the Imperial Tobacco Company, a big English trust. The fifth, the British American Tobacco Company, are manufacturers having their plants all over the world and the sixth, the Universal Leaf Tobacco Company, owns no tobacco product factories itself but operates as an independent buying, packing, and exporting firm for many manufacturers abroad and in the U.S.A.

Each of those six companies is in the possession of a large corps of well-trained buyers, which covers all the auction markets in the U.S.A.
Besides a member of each of these big buying organizations a few representatives of some other manufacturers and dealers and small speculators are usually operating in each auction market, but none of those latter people is part of an organization that covers all the tobacco markets of the country. Studying the impacts of so high a concentration of buying power in the hands of such a small number of companies on their purchasing practices, Nicholls found that there is, quite naturally, a tendency for them to recognize their common interest in non-aggressive buying policies but that, ever since the dissolution of the "Tobacco Trust" there has been but little evidence of outright collusion among them.

A futures market for leaf tobacco does not exist in the United States. An effort that was made to establish one in 1934 was a failure because, according to Tennant, there is no real function to perform for such a market. Storing of tobacco is an essential part of its processing for consumption and there is no reason for the manufacturers to pay others for doing it for them, as it is done best under their own supervision. Moreover, the future contracts were to run for months only, as is usual in futures markets, but tobacco storage is a matter of years. Hedging as an insurance against price fluctuations does not make much sense in the tobacco market either; to obtain proper blends and a constant quality manufacturers usually have to work two or three crops at a time and in general it is their habit to buy in all the markets. Last but not least the fact that the concept "quality" is very indeterminate, or anyway multidimensional, for this commodity is a serious drawback for this way of marketing. Every manufacturer has always had his own grading system.
which is different from the system of each of the other manufacturers, and the introduction of an official government grading system in 1929 has been unable to bring about any changes.

The Federal price support arrangements that were made under the Agricultural Adjustment Act of 1938 for a number of agricultural products, to keep their prices from falling too low beneath the general price and cost level for farmers, are also applicable to tobacco prices. Except under unusual circumstances, when direct purchases or other operations may be desirable, price support for tobacco is accomplished by a loan program. Eligible to participate in such a program are all producers of tobacco types for which no marketing quota has been proclaimed and all producers of tobacco types for which marketing quotas are in effect as far as they have not produced tobacco in excess of these quotas. If producers did vote against quotas for any year, price support loans are not available for that year.

All tobacco that is delivered for loan in a given crop year is pooled and sold later on through regular trade channels in such a manner as not to disrupt the market. If net profits on the sale of such pooled stocks are made these are distributed pro rata to the growers; if losses are made, however, these are assumed by the Commodity Credit Corporation under the "nonrecourse" provisions of the act. Loan rates are established for each tobacco class separately and on a grade basis, and information on the loan value of each basket of tobacco is made available to the growers before the auctioning begins. After the auction has been carried out the farmer can decide whether to place the tobacco under loan or not, if the highest bid was no more than the loan rate for any particular basket.
II. DIFFERENCES IN GROWING REGIONS, HANDLING PRACTICES,
MARKETING AND USES BETWEEN THE TOBACCO CLASSES

As was already mentioned before, the classes of tobacco that will be studied in this paper differ from each other in several respects.

One of these respects is the method of curing. Curing is the first drying process which the leaf needs after harvesting and during which, besides changes in the water content of the leaf and its color, some other invisible chemical changes occur. This curing has to be done on the farm immediately after harvesting and it is from the way in which this process is carried on and regulated there that the tobacco classes obtained their names.

Which method of curing will be used, however, by a given farmer has been determined in the course of time by the development of different varieties of plants for the different climates and types of soils of the growing regions, each of which varieties has its distinctive uses.

The flue-cured tobacco types, which are usually cured in closed barns provided with a system of heated flues, are grown in Virginia (type 11), North Carolina (type 11, 12 and 13), South Carolina (type 13) and in Georgia, Florida and Alabama (type 14). Together they form by far the largest tobacco class that is grown in the U.S.A. The average annual flue-cured crop increased from about 500 mill. pounds per year to about 1200 mill. pounds per year in the last 30 years (total average tobacco crops increased from about 1300 mill. pounds per year to about 2000 mill. pounds per year). They also form the most important class of U.S.A. tobaccos as far as exports are concerned. Roughly speaking, we could say that about 30% of the flue-cured class tobacco is exported nowadays and in the twenties even over 50% was shipped abroad. The crop finds its use mainly in
cigarette production, but can also be found in chewing and smoking blends.

Characteristic of the way of harvesting the flue-cured tobacco types is the so-called priming method (as opposed to the so-called stalk-cutting method, which involves less labor but does not allow all the leaves of a plant to attain the most desired stage of maturity). In the most southern flue-cured tobacco states harvesting begins very early in the summer, so that by the end of July the first leaf can be brought to the auction markets. As the season proceeds the more northern areas follow them and as a rule the whole marketing is practically completed before midwinter.

Fire-cured or dark-fired tobacco types are the types that are cured in the heat and smoke of open fires. They are mainly grown in North-Western Tennessee (type 22, 23) and South Western Kentucky (type 22, 23, 24) and in Virginia (type 21). The principal domestic use is in snuff; smaller quantities go into the manufacturing of smoking tobaccos, of so-called Italian cigars and plugs.

Fire-cured tobacco plantings have been gradually curtailed throughout the last decade as a result of shifts in consuming habits. Partly because of the difficulties into which this has brought the local growers, by-product diversion programs have been devised by various government agencies for most crops since 1931.

Of the total crop, which amounted to a few hundred million pounds in the early twenties, but ranged between 50 and 100 million pounds in the last ten years, about half (formerly far more) is exported. The crop is usually harvested in the late fall and marketed from December through March.
The air-cured tobacco types are normally cured in open barns without the aid of artificial heat, though in a very damp and rainy season some artificial heating may be applied. In harvesting, the stalks with the leaves are cut near the ground and suspended in the curing barns. The class is usually subdivided into the light air-cured types 31 (Burley) and 32 (Maryland) and the dark air-cured types 35-37.

The Burley crop is the most important crop among the air-cured types. It has increased from 200-300 million pounds a year in the early twenties to 500 to 600 million pounds a year after World War II.

The center of the growing area is Kentucky and Tennessee, but it stretches out also over smaller parts of 8 other states that border these two.

Practically all Burley leaf is consumed in the U.S.A., for the larger part in the form of cigarettes, further in smoking and chewing tobaccos. It is usually blended with other types.

Burley leaf as a component of cigarettes is far more popular in the U.S.A. than in the main import countries for American tobaccos, where a good part of the more discriminating cigarette smokers is still attached to pure flue-cured blends.

The Burley plants are harvested in the fall and the leaf is auctioned on the local markets from December until about the middle of February.

Maryland has been a tobacco state from the earliest colonial times. The crop is grown on an area in Southern Maryland that, apart from short run fluctuations, has been of practically constant size throughout the last century and yielded crops from 20-30 million pounds per year on the average.

Maryland tobacco forms a type by itself that is not grown
in any other states. The leaf is characterized by its excellent fire-holding capacity, but is rather neutral in aroma. It is highly valued as a component for cigarette and smoking blends both abroad and in the U.S.A. Originally it was almost entirely an export product and even until the early thirties about half of the Maryland crop was still shipped abroad. In recent years exports were only about 25% of the total crop, but the decrease in the volume of exports has been fully compensated by an increased domestic use.

Maryland is the only tobacco type that is still partly sold at a so-called closed-bid hogshead market in the U.S.A. In fact, loose leaf marketing was not introduced in the Maryland area until 1939. From that year, however, it has been rapidly increasing. The long persistence of the hogshead selling method here can be partly explained by the fact that for so long a time the Maryland tobacco type was mainly an export type, partly by the nature of the product itself. The freshly cured Maryland leaf differs from other types of leaf in this respect that it is very thin, does not easily take up moisture again and usually does not need redrying in special redrying plants like other tobaccos do. Moreover, not so many different grades are distinguished. So after the curing it can be graded and packed right on the farm or by a transfer buyer in such a form that it is ready for shipment immediately after sale, an arrangement that was preferred in the past especially by some of the major foreign buyers.

Though the Baltimore hogshead market is officially open throughout the year, both the auctioning of Maryland in the hogshead market as well as the loose leaf marketing usually take place in the course of the summer following the growing year.
The dark air-cured tobacco types are in several respects very comparable with the dark fire-cured types. They are mainly grown in Western Kentucky (types 35 and 36) and further to some extent in Indiana and Tennessee (type 35) and in Virginia (type 37). Just like the fire-cured class, the dark air-cured tobacco class does not contain any cigarette tobacco types, its use is limited to smoking and chewing products and snuff. This has made the demand for dark air-cured subject to a strong downward trend as a result of shifts in the consuming habits in the direction of cigarettes. The production had to be curtailed from about a hundred million pounds per year in the early twenties to about one-third of that quantity in recent years.

The marketing season for all of the three dark air-cured types is usually scheduled from late in November until about the beginning of March. Exports play a far less important role for this class than for the fire-cured class.

From the three dark air-cured types that are distinguished, the third one (type 37) is the one that is sometimes classified as "sun-cured". This accords with the former practice of hanging the tobacco in the sun during part of the curing process instead of in an open barn.

In all the growing regions mentioned above the bulk of the tobacco crop is grown on a considerable number of relatively small farms. (The average farm planting is less than 3 acres.) In part of these areas it constitutes the main source of cash income for farmers; in other parts, however, some other type of farming is of equal or greater importance than specialised tobacco production.

Kohn, who takes his data on this subject from census data and from Elliott's map of farming areas, points out that in the Georgia-Florida
flue-cured region there are areas with specialized tobacco farming, as well as areas with combination (tobacco and cotton) farming and areas where general farming is predominant.

The same is true for the big flue-cured region in Virginia and the Carolinas. Here, moreover, there is also some tobacco grown in mainly cotton areas.

A similar diversity of farming conditions is shown within the Kentucky-Tennessee region. There the greatest concentration of tobacco acreage appears in areas with specialized tobacco farming and in areas where the combinations tobacco-livestock or tobacco-general farming are prevalent.

In southern Maryland, however, no other source of income is important in comparison with tobacco in those areas where tobacco is grown.

In all the regions where tobacco farming is carried on, tobacco is the most labor intensive crop, large amounts of labor being used in growing the crop, as well as in harvesting, curing, stripping, and grading. Cash outlays for labor, however, are limited in many cases because family labor plays an important role.

In the flue-cured area the most important item, as far as cash outlay is concerned, is fertilizer. On most farms heavy applications of fertilizer are required to obtain satisfactory yield and quality. In some other areas cash outlays for fertilizer can be less because of more fertile soils, availability of manure or by the use of appropriate methods of crop rotation. In general the Burley crop is grown on much more fertile soil than the flue-cured crop, while the leading Maryland soils stand somewhere in between.
III. FACTORS DETERMINING THE ANNUAL PRODUCTION OF LEAF TOBACCO BY THE FARMERS

1. Generally speaking, the annual production of an agricultural commodity in a free economy can be supposed to be determined by price expectations for the product and production costs on one hand, and by some factors which, from the point of view of the economist, can be considered data on the other hand. In an analysis of short-run supply fluctuations of a given product in a given geographical environment, the latter category will include, as a rule, first the weather conditions and second the occurrence of such hazards as insect pests and diseases.

In a non-free or not entirely free economy price and cost influences may be wholly or partially replaced by government incentives or restrictions.

2. Weather conditions, insects and diseases can be of crucial importance as well for the yield per acre as for the quality of the tobacco crop. The yield per acre fluctuation from year to year is a variable that, either implicitly or explicitly, has to enter in any supply or price equation for an agricultural crop, as total production is directly proportional to it. The quality element, though we may not be able to introduce it as such in our equations, will also be an important factor to know something about, as the only statistical index which is as a rule available for measuring price expectations is often found in the price experience of the past, and such an index may be biased by the influence of the quality of former crops on the prices that have been received for them.

3. Government interference with the tobacco culture, though existing to some extent before in the form of stimulating improvement of cultural
practices, experiment station research, market inspection, etc., did not influence the production directly before 1934.

In 1933, however, the first Agricultural Adjustment Act was passed, and tobacco being considered in this act to be one of the so-called "basic commodities," supply of which tended to be in excess of expected demand, provisions were made to control the supply of the different tobacco types to some extent. The first tobacco crops affected by the system were the crops of 1934 and 1935; restrictive acreage allotments were set and benefit payments were made to farmers who cooperated with this program while a heavy tax was imposed on those who did not. To make these regulations effective approval of the quota had to be obtained first from a qualified majority of growers.

In 1936, a Supreme Court decision invalidated the section of the A.A.A. providing for these production controls and for the next two years the U.S.D.A. tobacco policy became one of adjusting production to demand with only help of benefit payments to cooperating growers under the Soil Conservation and Domestic Allotment Act. The revised A.A.A. of 1938 provided again for the announcement of marketing quotas that could be enforced upon all the growers of a certain tobacco type after approval of the quota by a majority of growers. And as a matter of fact ever since 1938 quotas were actually announced and approved each year for all tobacco types that are dealt with in this paper except in 1939 and except for Maryland tobacco.

Since 1940 quotas were no longer set in terms of poundage, but only in terms of acreage, so farmers could increase their production within the limits of the quota by increasing yields per acre.

Price expectations and cost factors can influence the acreage involved in tobacco culture as well as the quality of the product and the yield per acre.
Acreage will be largely determined by these factors in so far as rational economic behavior of the farmers can be presupposed. Yield and quality are to a far less extent determined by the behavior of the farmers. It is here that weather, diseases, etc. can play an important role.

But to some extent farmers can meet or even prevent many of these hazards and they are, of course, more likely to do so when they expect that the expenses that they have to make for that will be paid for by the returns of the crop.

Proper cultural and handling practices in a given year and even extra-care given to those things (e.g., use of fertilizer) can be encouraged by favorable price and cost relations or government incentives, and will have a positive influence on yield and quality of the crop of such a year and in many cases even also on the crops of the following years.

Several efforts have been made in the last few years to find statistical measures for the influence of one or more of the factors mentioned above.

Tennant, discussing the supply of leaf tobacco for the different cigarette types in his book, *The American Cigarette Industry*, tried to determine the supply-elasticity with respect to average prices received for the given tobacco types in the preceding year using time series for the years 1910-1947. The theory behind his measurements was that recent price experience could be considered indicative for the price expectations of the individual farmers, and that government proposals for acreage control under the A.A.A. were probably also based largely on that.

* The changes from year to year in the allotted acreages that were set under the Agricultural Adjustment Acts cannot be supposed to show any causal relationship to prices in preceding years though, because, according to the law, they should be based directly on what is defined there as normal export needs, normal domestic disappearance, and old stocks available.
Allowing for the possibility of trend developments in the period considered and using linear regression equations, he obtained the following results:

For the years 1910-1947 \[ x_1 = -138.0 + 8.79 x_2 + 20.22 x_3 \]
For the years 1910-1933 \[ x_1 = -168.5 + 7.26 x_2 + 23.49 x_3 \]
For the years 1934-1947 \[ x_1 = -411.1 + 17.56 x_2 \]

In these equations \( x_1 \) is the production in millions of pounds, \( x_2 \) is the price in the preceding year in cents per pound, and \( x_3 \) is time. The regression equations account for 85.2%, 77.8%, 63.3% respectively of the yearly variations in production. The mean elasticities of supply are +0.513, +0.293, +0.552 respectively. Following these figures crop control seems not to have had the tendency to do away with the supply-factor "price expectations", but rather to have made it work somewhat better.

Tennant indicates that apparently the correlation between production and prices is mainly due to a correlation between acreage and prices because his graphs indicate only a weak relationship between yield and prices. But he pays no further attention to each of those two components of total production separately because "it is the supply of leaf, not acreage", in which he is "mainly interested. And the trend of production is linear when plotted on an arithmetic scale while the acreage trend is nonlinear".

Computations for Burley and Maryland were not carried out by Tennant, though he makes some tentative remarks on the supply elasticity of those two types which are based on the graphs he gives for each of them.
Far deeper into the subject of supply determining factors went

Johnson in his study on the effects of Burley Tobacco Control Programs from 11
1933-1950.

To carry out a statistical analysis of the production and marketing
process of Burley, he divides up this whole process into three stages:

viz., an acreage determining stage from early in the year till spring, a
yield determining stage from spring till the beginning of the auction
period, and a price determining stage which is the auction period. For
each stage a separate regression analysis is carried out.

As only the period of production control and price support is studied
the nature of his equations is entirely based on the structure of the
tobacco economy in that particular period. His explanation of acreage,
e.g., is really an explanation of the extent to which there was over- or
underplanting of the total of all acreage allotments, the allotments being
considered data for any given year. *

Over- or underplanting of the allotted acreage has, according to Johnson,
been mainly responding to:

a. the price of Burley in the preceding year;
b. the size of the allotment relative to the acreage handled in
   preceding years;
c. the penalties imposed on producers for overplanting (incl. the
   withholding of benefits);
d. the prices paid for items and services on farms that were
typical for the studied counties.

*Johnson's model for the price determining period is also especially adapted
to the market structure under the A.A.A. legislation. This part of his
analysis could not yet be discussed in this preliminary paper.
Yield variations from year to year could be largely explained by correlating them with:

a. the price of Burley in the preceding year;
b. prices paid by farmers for items and services (including hired labor) used in production;
c. a trend series;
d. a measure for the effect of weather on yields, which was constructed from figures on yields of experiment plots where cultural practices had remained unchanged from year to year;

e. change in quality of land used as indicated by contraction and expansion of allotments.

As to the effects of price experience on acreage and yield Johnson finds:

A. that U.S. underplantings for Burley tend to decrease 1,000 acres for each 1 cent increase in the real price of Burley;

B. that the U.S. average yield tended to change with price, other conditions about average, as indicated by the following figures:

<table>
<thead>
<tr>
<th>Change in the U.S. season average price in the preceding year:</th>
<th>Increase in the U.S. average yield: (in lb. per acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>from 10 cts to 20 cts</td>
<td>94</td>
</tr>
<tr>
<td>from 20 cts to 30 cts</td>
<td>55</td>
</tr>
<tr>
<td>from 30 cts to 40 cts</td>
<td>39</td>
</tr>
<tr>
<td>from 40 cts to 50 cts</td>
<td>31</td>
</tr>
</tbody>
</table>

These and further attempts to give a satisfactory explanation of tobacco acreage and yield per acre by means of regression analysis have been hampered badly until now by lack of sufficient and reliable data.

Johnson, who limited his researches to Burley tobacco and to the period 1933-1950, experienced this difficulty. For other tobacco types and earlier years the prospects seem to be still worse. Some further

* Johnson discusses the problem of his lack of data for Burley and the shortcomings of some of the data and of his final results elaborately on pages 37-70 and 105-112 of his publication.
statistical analysis for these other types and earlier years has been set up especially for this paper and is still going on. Efforts have been made to take also some price experience with competing agricultural products (cotton, livestock products) into account. Till now, however, not much evidence of any clear year to year relationship between yield and price experience has been pointed out for those other types, only as far as the acreages are concerned there were more or less significant indications that they were correlated with the price experience in the year before, at least till 1933.

The presence of marked trend movements of one form or another could be pointed out in historical acreage and yield series of practically all tobacco types. In most of the yield per acre series trends have been going upward during the last decades because of technical improvements, especially since a more common use of improved practices was strongly stimulated by acreage restrictions. Significant up- and downward trends in the acreage development of different tobacco types have been induced in the course of time by shifts in demand from one tobacco type to another.

The causes of the latter lay in all cases in the behavior of the ultimate consumers of tobacco products, a subject into which the next chapter will go more profoundly.
THE ULTIMATE DEMAND FOR TOBACCO PRODUCTS

1 Practically all the ultimate demand for leaf tobaccos produced in the U.S.A. is demand for those tobacco products, which are used for pleasure, viz. as cigars, cigarettes, smoking and chewing tobaccos and snuff, and which are to some extent substitutes for each other.

When we consider historical statistical series on the consumption per head of population for each of these products we see that most of these series show, besides yearly fluctuations, strong trend developments. In some periods and for some products these trends show an upward movement, for other periods or products they move downward, for tobacco consumption as a whole the trend has been upward, however, through the last century.

As a matter of fact in the long run the trends - that is to say, for these articles, social habits and fashions - seem to have played a far bigger role than the comparatively moderate fluctuations in consumption from one year to another.

2 As far as the U.S.A. is concerned it has been mainly the trend in cigarette consumption that went rapidly upward during the last fifty years, for most other tobacco products increases in use per capita came to an end around 1910.

The use of chewing tobacco and cigars began to show a marked downward trend after World War I, the consumption of smoking tobacco not before the beginning of World War II, at the same time when the consumption of snuff, that had been declining ever since the great depression but fairly stable before, experienced a temporary recovery. The latter phenomena, as well as an even stronger temporary increase of the use of chewing tobacco during
World War II, can be easily explained by the greater employment during the war in factories where smoking was forbidden.

The fluctuations from year to year in the consumption of tobacco products in general, and in the consumption of cigarettes more especially, have been studied by Schoenberg, Gottsegen, and Tennant and the results of the studies of the former two as far as price and income elasticities are concerned have been summarized and criticized by Tennant.

These studies reveal that price elasticities are very low in general but both in time series analysis as in cross section studies there is some response to income. Moreover, there was some evidence of what may have been short run substitution between different kinds of tobacco products in response to price and income changes; there was notably a shift away from other tobacco products and toward smoking tobacco (tobacco for pipes and roll your own cigarettes) during the depression from 1929 to 1932.

Though by far the most important uses of leaf tobacco are those in the products mentioned above; the manufacturing of by-products, especially out of the dark tobacco types, has become much more significant during and after World War II than it has ever been before.

In the tobacco manufacturing industry the inputs of other raw materials besides leaf tobacco are so small that they hardly play any role in the total costs. In the United States, however, and in some other countries too,
the selling costs of the industry play a tremendous role and, according

to Tennant, it has been partly the dependency of sales on publicity
that determined the oligopolistic structure of the industry.

Another cost item of smoking articles that should be especially
mentioned are the taxes.

5 In most of the foreign countries that take American tobaccos the
prices of the products are either influenced to a large extent by con-
siderable import duties or other taxes, or set by a government monopoly
for this trade.

In the United Kingdom, one of the main import countries for American
flue-cured leaf, the import duty was from 1936-1938 £2.35 per pound, com-
pared with average auction prices for flue-cured £0.22 - £0.33 per pound;
in 1947 it was £11.07 compared with an average flue-cured price of £0.41
per pound.
V. SOME THEORY AND DATA ON THE BEHAVIOR OF LEAF BUYERS

1. The nature of the demand curve for tobacco leaf is determined primarily by the nature of the expected future demand for the products that are going to be made out of the leaf, but further also by the stockholding policy of the leaf buyers themselves.

The best way to set up a theory with respect to their demand curve may be to start from the proportion between buyers' and manufacturers' stocks on one hand and expected disappearance on the other hand, and to define this proportion in years of normal supply as the normal stockholding proportion. Further to assume that this normal proportion as well as the actual proportion between the two are a function of:

A. the value which manufacturers attach to having a big leaf assortment in stock and the influence of aging on the smoking quality of the leaf.

B. the costs of stockholding.

The actual proportion between the two for any given year and any given manufacturer is affected moreover by

C. the prices purchasers have to pay for leaf in that given year as compared with price expectations for the years to come.

2. In normal times very large inventories of tobacco are carried by most manufacturers. Most of them feel that a year or more of aging gives an improvement of quality to the leaf that is almost indispensably required before it can be processed further into smoking articles, etc. Moreover, since the quality of the crop varies from one year to another the working of more than one crop at a time assures a more uniform quality of the products throughout the years. From statistical data on tobacco stocks in
the past that are available one could conclude that the average stockholding proportion in the last decades lay somewhere in the neighborhood of 2.5 or 3.

Suppose now, however, that in some specific year, at the beginning of which stocks happened to be just normal, an extra large crop has been harvested, which has a depressing influence on prices. (Under a price support system there is of course a limit to such an effect.) Then, just as would occur with any other storeable crop, rational behavior will lead those buyers who can make enough storage facilities available to keep some extra, more or less speculative, stocks. This will happen as soon as the difference between the current market prices and the expected prices of the next few years is considered to make good the extra carry-over costs. Maybe even slightly earlier, viz. if the longer storage time, that will result from this extra buying, is expected to result in some extra gain in the quality of the leaf. (The "normal" storage time was probably slightly shorter than the time, that could be considered optimal from a quality point of view, for from an economic point of view it should tend to be so long that marginal gain in quality at that point is just equal to marginal carrying costs).

On the other hand, there could also, after a normal year, be a year in which, because of scarce supply, market prices become so high that downward adjustments in the tobacco stocks are likely to be made by each of the individual purchasers.

*In the formula the A.A.A. legislation gives for determining "normal supply" (the sum of old carry-over stocks plus new crop that should be aimed at when setting the production quota) at the beginning of the auction period is defined as 2.75 times a normal year's domestic disappearance = 1.65 times a normal year's exports.
This would happen, in general, when market prices of the crop of the present year are so much above expected prices in the next few years, that the processors accept the disadvantages of temporarily working with shorter stocks than normal. This could mean, for an individual processing firm, taking the chance of losing part of its selling market in the near future because of working with an insufficient assortment or general quality of leaf, or, alternatively, having to incur extra selling costs to hold the market. The firm's managers may also figure that they will be able to maintain quality by giving extra care to the production process in all other respects or by buying somewhat better grades from next year's crop than would have been necessary otherwise. They may even expect no serious problems to arise from this buying policy at all, as other manufacturers are probably going to be in the same position. For then, even if the quality of the given firm's product would have to change a little bit, consumers' buying behavior would probably not be affected; most consumers (as far as they do have any real judgment on quality) compare the different brands between which they can choose at a given moment rather than notice what happens to a given brand over the years.

Anyway, the higher the prices of the leaf are bid up in such a year, the bigger the role, of course, these and similar considerations are likely to play for each manufacturer. Data given by Nicholls on the statements about the stockholding policy of different manufacturers, support more or less our assumption that such downward adjustments certainly can be made rather extensively, without interfering with the continuity of the output of final tobacco products. For average stockholding proportions over a number of years vary considerably from manufacturer to manufacturer and were different
in different periods of time; Liggett and Myers's average ratio of inventories on July 1 to auction purchases was 288% for the years 1934-1939, but Reynolds's ratio averaged in that same period only 212% and for the longer period 1929-1939 Reynolds's ratio was 184%. The difference between the two manufacturers, which can be considered to have been made more or less voluntarily by them, illustrates the possibilities that seem to exist for varying the time of aging, if proper blending and processing techniques are applied.

All this means that, even if the demand for final products were completely inelastic with respect to price, an elasticity which is well above zero may still be found in the demand for leaf by each of the individual producers. And if we consider things the other way round and from the point of view of the whole tobacco industry, that even crop variations from one year to another as large as 50% or more of one year's average crop could be leveled out in the aging phase between the auction floor and ultimate consumption through a sufficient flexibility of the market price of the leaf.
VI. A MODEL FOR THE LEAF MARKETS

1. The different typical characteristics of tobacco stockholding that were mentioned in chapter V (besides the fact that each manufacturer apparently likes to pick out his own grades, subgrades and qualities* from each crop in the year of harvesting, and take care of a proper conditioning during the time of aging in his own plants) imply that such price and carry-over theories for agricultural products as given by Working, Williams, etc. cannot be applied without changes to this particular commodity.

It is mainly the great downward flexibility of tobacco stocks below their normal level, and the fact that there is practically no regular trade in stocks left over from a former crop, and no futures trade, that makes tobacco markets so very different from the markets for grain, etc. Moreover, as has already been pointed out before, the bulk of the demand for the cigarette types is concentrated in the hands of six buyers only, five of which are processors themselves.

2. Because of the flexibility in the stockholding policy on the demand side on one hand and the lack of elasticity of short-run supply on the other, it seems reasonable to suppose that the equilibrium prices in the market will be practically set by the amounts the buyers want to pay. And those are again determined by the advantages and disadvantages each of the different

*Though an official government grading system is provided for at practically all the auctions nowadays, each manufacturer still uses his own grading system which is independent from that of any other firm as well as independent of that of the government (see art Lee R. Martin, Journal of Farm Economics 1950 p. 907 "Some aspects of research in the marketing of tobacco leaf"
manufacturers sees in taking such a part of the given quantity of leaf that ultimately this whole quantity has disappeared into their aggregate stocks.

As such the price can be supposed to be a function of the size and quality of the crop available, the quantities that the manufacturers require to obtain what they consider normal stocks on one hand, and the estimated costs of putting off part of the buying to a future moment on the other hand.

When there is set a support price by the government the ultimate price for each grade will be either an equilibrium price as defined above or its support price, whichever is higher.

3 There are several reasons to suppose that the yearly fluctuations in disappearance are hardly influenced by the prices of the leaf. For domestic tobacco manufacturers the costs of this material form only a relatively small % of the costs of the final product, while moreover wide profit margins and a tendency to keep the finished product prices more or less uniform and rigid have existed throughout the years. For importers in many foreign countries the net price of the leaf does not play too big a role in their total costs either, especially if their government charges heavy import duties (other than ad valorem duties) on the leaf and/or taxes on the final products.

Other factors, like expected disposable income in the U.S.A., and the expected possibilities for exports of goods to the consuming countries abroad (as determined, probably, by income abroad, rates of exchange, transportation facilities available, balance of trade difficulties, etc.) may in general be supposed to play a much bigger role.

4 We will assume, therefore, as a first approach, that buyers base their expectations as to future domestic disappearance mainly on the current level
of domestic industrial production, (on which future disposable income will be largely dependent), and their export expectations on the actual total exports of all commodities together to the countries, which are most relevant to them, during some recent period. Moreover, it is possible that besides that they will pay some attention to the degree to which they experienced actual disappearance of tobacco leaf during the last year (this past disappearance may be important either because disappearance expectations can be based on it to some extent, or it may be important as far as some manufacturers may just play a policy of stock replacement instead of actually estimating their future requirements).

The prices which manufacturers will have to pay for future crops can be expected to be different from this year's prices mainly because of a different size and quality of future years' supply. As a rule there will be no reason to expect demand factors to affect next year's price differently from this year's price.

As to the influence of weather and other natural conditions on quantity and quality of future crops, buyers cannot do much more than just expect them to be normal.

But, as it is likely that farmers will be inclined to respond to extraordinarily high or low prices this year by growing next year more or less (respectively) tobacco than otherwise would have been the case, this would make next year's price dependent on this year's price (i.e., all the factors that can be supposed to determine this year's price) through the fact that next year's supply can be supposed to respond to it. It may be expected that the latter responsiveness was different before and after the existence of production control and price supporting agencies.
The following model could be based now on the assumptions that were
made throughout this chapter and some earlier chapters:

**Symbols**

- **A** = acreage
- **Y** = yield per acre
- **C** = total crop
- **P** = price per pound
- **L** = legislation (existence or non-existence)
- **D** = total disappearance per year
- **D^d** = domestic disappearance per year
- **D^e** = disappearance into exports per year
- **n^d** = normal stockholding proportion of domestic manufacturers and dealers
- **n^e** = normal stockholding proportion of exporters
- **R** = total requirements
- **E** = carry-over from old crops (accumulated)
- **W** = weather
- **Q** = quality
- **t** = time
- **F** = index domestic industrial production, all commodities
- **E** = quantity index exports of the U.S.A., all commodities

**Equations**

1. \( C_t = A_t \times Y_t \)
2. \( Y_t = f_1 (W_t, t, P_{t-1}) \)
3. \( A_t = f_2 (P_{t-1}, t, L) \)
4. \( P_t = f_3 (C_t, R_t, Q_t, F_{t+1}, Q_t, L) \)
5. \( R_t = n^d \times D^d_t + n^e \times D^e_t \)
6. \( F_{t+1} = f_3 (C^d_{t+1}, R^d_{t+1}, Q_{t+1}, F_{t+2}, Q) \)
7. \( C_{t+1} = X_{t+1} \times Y_{t+1} = f_4 (t, P_t, L, W) \)
8. \( F_{t+1} = n^d D^d_{t+1} + n^e D^e_{t+1} + C_t - D^d_t - D^e_t \)

*There is a slight inconsistency in the way some of the signs and symbols are used:
- \( F_{t+1} \) will mean expectation in year \( t \) with regard to price in year \( t+1 \)
- \( F_{t+2} \) will mean expectation in year \( t+1 \) with regard to price in year \( t+2 \)
- \( D^d_t \) will mean expectation in year \( t \) with regard to average disappearance in years \( t+1 \) to \( t+T \)
- \( D^e_t \) will mean expectation in year \( t+1 \) with regard to average disappearance in years \( t+2 \) to \( t+T+1 \)*
Now suppose that (10) \( \overline{D}_t^v = \overline{D}_t^{v+1} = f_5(P_{t-1}, D_{t-1}^e) \) and (11) \( \overline{D}_t^l = \overline{D}_t^{l+1} = f_6(E_{t-1}, D_{t-1}^i) \) and that (12) \( \overline{F}_{t+2} = \overline{P}_t \), both apart from trends, then we have: (13) \( \overline{F}_{t+1} = f_7(t, P_t, L, \overline{w}, n^v, n^{iv}, \overline{D}_t^v, \overline{D}_t^l, O_t, C_t, \overline{q}) \) and (14) \( P_t = f_8(C_t, O_t, \overline{D}_t^v, \overline{D}_t^l, L, q_t, t, \overline{w}, n^v, n^{iv}, \overline{p}, \overline{q}) \) wherein \( \overline{w}, n^v, n^{iv}, \overline{p}, \overline{q} \), and \( \overline{q} \) are constants, so that (14) can be cleaned up into (15) \( P_t = f_9(C_t, O_t, \overline{D}_t^v, \overline{D}_t^l, L, q_t, t) \).

Now assuming that \( \overline{D}_t^v \) and \( \overline{D}_t^l \) can be based together on (15) \( D_{t-1}^v = D_{t-1}^l + D_{t-1}^{v+l} \) and assuming \( C \) and \( O \) in most years perfect substitutes for each other (which holds as long as stocks are not so short that proper aging is endangered) we have: (16) \( P_t = f_8(C_t + O_t, P_{t-1}, E_{t-1}, D_{t-1}^v, L, q_t, t) \).

---

*Of course the set of equations could be extended over some more future years in which case the price expectation for a more remote future would have to be supposed to equal \( \overline{P}_t \).

**This assumption is made partly to reduce the number of variables in (16), partly because no statistical data on \( D^v \) and \( D^{iv} \) separately were available before 1923.
VII. TRYING OUT THE MODEL BY MEANS OF STATISTICAL ANALYSIS

1. There were quite a good many assumptions that had to be made for the model given in VI. To make a little more sure whether they are valid and relevant for the given markets, correlation analyses of the prices of different tobacco types have been tried out. Because usable quality indices were not available over a sufficient number of years and those series which were supposed to indicate the buyers' expectations are without doubt indicators which are far from perfect, not too high correlation coefficient could be expected.* But besides looking at the results for each tobacco class separately, we may have an opportunity to throw some more light on the problems involved because we can compare the results for the different tobacco classes with each other now. After all it is mainly the same group of buyers that is interested in all 5 of the classes, so there is some reason to assume that their basic behavior will be more or less the same when buying each of the different classes.

Correlation method and variables used.

As a first approach we assumed linear correlation in the logs. In connection with the foregoing analysis we related by means of the least square method:

1. the deflated average auction price of the crop of a given tobacco class in a given year,
2. total supply of tobacco of this class, being the sum of new crop and carry-over, per head of population in the U.S.A.,
3. the index of industrial production per head of population in the U.S.A. in a recent year,
4. an index for the quantity of exports in general to countries usually buying the given tobacco types.

*Disadvantages of research of this kind into tobacco markets compared with other markets are mainly: quality is difficult to measure on one hand and has much influence on prices on the other hand; and behavior of the buyers may be based on expectations as far as three or more years ahead.
(5) disappearance of tobacco leaf per head of population in the crop-year before, and
(6) the existence of the A.A.A.

Deflation of the auction prices was done with the general wholesale price indexes of the F.R.B., as they were in some month at the beginning of the auction period (for flue-cured July, for Burley and the dark types December, for Maryland May of the next year). Population figures were midyear figures; no interpolation was done to get exactly the right month of the year and for recent years only rough estimates were made, because population changes only gradually anyway, so there was no fear of making serious mistakes by dealing rather roughly with this variable in the first approach.

The index of industrial prod. was the index of the preceding calendar year for flue-cured (maybe correlation could still be improved if the preceding year was taken), for the dark types and Burley the current calendar year was used, and for Maryland the index for the last crop year has been compiled. The export quantity indices have been compiled as:

\[
\frac{(\text{value export to those countries})}{(\text{value all exports of the U.S.A.})} \times \frac{(\text{quantity index total exports U.S.A.})}{(\text{midyear population})}
\]

and covered the same periods as the production indices mentioned before.
### Results

<table>
<thead>
<tr>
<th>Tobacco class</th>
<th>Period</th>
<th>Explaining variables,</th>
<th>regression coefficients</th>
<th>Corr. coef.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Supply U.S. prod. index</td>
<td>Exp. index</td>
<td>Disapp.</td>
</tr>
<tr>
<td>I Flue-c.</td>
<td>1921-1950 incl.</td>
<td>-0.996 (±0.279) +0.519 (±0.165) +0.121 (±0.070)</td>
<td>-</td>
<td>+0.305 (±0.046)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III Burley</td>
<td>1933-1949 incl.</td>
<td>-1.158 (±... ) +0.821 (±... )</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1921-1949 incl.</td>
<td>-1.122 (±... ) +0.696 (±... )</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>b</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1921-1949 incl.</td>
<td>-1.323 (±0.326) +0.472 (±0.187)</td>
<td>-</td>
<td>+0.609 (+0.393)</td>
</tr>
<tr>
<td>c</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I Fire-c.</td>
<td>1921-1950 incl.</td>
<td>-0.328 (±0.306) +0.560 (±0.180) +0.123 (±0.092) +0.503 (±0.219) +0.151 (±0.070)</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maryland</td>
<td>1929-1950 incl.</td>
<td>-0.307 (±0.394) +0.370 (±0.300) +0.210 (±0.193) -0.338 (±0.471) +0.008 (±0.096)</td>
<td>0.806</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dark air-c.</td>
<td>1921-1950 incl.</td>
<td>-0.200 (±0.341) +0.391 (±0.314) +0.31 (±0.285) +0.611 (±0.317) +0.237 (±0.089)</td>
<td>0.811</td>
<td></td>
</tr>
</tbody>
</table>

A graphical representation of the residuals is given in chart 1.
Notes

I. export index compiled for exp. to Un. K. only, this country always taking the bulk of flue-cured exports of the better grades. There was no special reason for leaving disappearance out; this just happened to be the phase in which this research was at the time the paper had to be completed.

II. exports preliminary left out. Disapp. is here dominate disapp. only. Burley exports are usually about 5% of total crop only.

III. export index compiled for exp. to continental Europe only.

IV. export index compiled for exports to total Europe only. Originally another computation was made, wherein disappearance based on crop year 1/3 - 1/4 was used, as given in official statistics, and export and production indices for the calendar year. As, however, all available stock data include only stocks with manufacturers and dealers, which are of course lowest right before the auction in May instead of at the period of harvesting, this computation was considered not useful after second thoughts. And January stock figures for computing total supply and disappearance were replaced by April data (May data not being available). The statistical result of the first computation, for years 1921-1950 were: regression coefficients: -0.193 resp +0.229 resp +0.318 resp -0.470 resp +0.115, correlation coefficient 0.77.

V. preliminary: as import countries changed through the year an export index to all countries was used for this first approach, but apparently this does not give a very good correlation in the war years.

Multicollinearity may have biased many of those coefficients more or less. For Flue-cured, correlation between supply and prod. index was 0.72; between ind. prod and export it was 0.57. For Burley, correlation between disapp. and prod index was even 0.85.
CHART I

Regression

Equation

Residuals

I
+ 0.10
0
- 0.10
+ 0.10

II
0
- 0.10
+ 0.10

III
0
- 0.10
+ 0.10

IV
0
- 0.10
+ 0.10

V
0
- 0.10

1920 1925 1930 1935 1940 1945 1950
VIII. SOME REMARKS ON THE STATISTICAL RESULTS

1 None of the correlation coefficients is very high; they are all between 0.80 and 0.86. Apparently some other variables, not taken into account, play a rather important role besides the variables that are used.

2 The most important among those omitted may have been the quality factor, which had to be left out because no good data were available. This hypothesis is supported by the fact that the correlation coefficient is highest for flue-cured, the geographical distribution and harvesting times of which types being the most widespread. The Maryland coefficient can be considered worst, if we take into account that the period covered by the correlation on this type is much shorter than that of flue-cured. This could have something to do with the fact that all Maryland production is concentrated in a relatively small area.

3 Another variable that might have improved correlation, but has not yet been used was a trend. It was considered a danger of using a trend in this first analysis that this would possibly have unduly diminished the regression coefficients of some other factors, that contained an outspoken trend themselves, e.g., disappearance. The danger of not using any independent trend is, of course, that now too big regression coefficients have been found for those variables.

4 The few quality data that could be made available were compared with the residuals afterwards. They were:

(a) the quality index series for Burley for the years 1936-1949, published recently by Dr. Glenn L. Johnson. It is not known how this index has been compiled, the only thing that is known about it is that Johnson himself did not consider it too good, because it was not sensitive to changing weights, assigned in the market place to different characteristics of the leaf.
In his own auction model he obtains an insignificant value and an incorrect sign for the regression coefficient of this variable. Comparison of Johnson's index with our Burley residuals (see chart 2) shows a good correlation between the two series from 1936-1942, and a bad, in fact negative, correlation thereafter.

(b) some verbal information that could be made available and with which some residuals do not compare too unfavorably:

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>&quot;quality damaged by floods and heavy rain&quot;</td>
</tr>
<tr>
<td>1941</td>
<td>&quot;excellent quality&quot;</td>
</tr>
<tr>
<td>1942</td>
<td>&quot;type 12 below average quality&quot;</td>
</tr>
<tr>
<td>1943</td>
<td>&quot;below normal&quot;</td>
</tr>
<tr>
<td>1944</td>
<td>&quot;probably better than 1943&quot;</td>
</tr>
<tr>
<td>1946</td>
<td>&quot;quality type 12 better than 1945&quot;</td>
</tr>
<tr>
<td></td>
<td>Type 1: in 1946: &quot;better quality than usual&quot;</td>
</tr>
<tr>
<td>1947</td>
<td>Type 1: &quot;high&quot;</td>
</tr>
<tr>
<td></td>
<td>Type 2: &quot;low&quot;</td>
</tr>
<tr>
<td></td>
<td>Type 12: &quot;normal&quot;</td>
</tr>
<tr>
<td></td>
<td>Type 11: &quot;large % lower grade&quot;</td>
</tr>
<tr>
<td>1950</td>
<td>&quot;generally high quality&quot;</td>
</tr>
</tbody>
</table>

(Source: Tobacco Situation)

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920, 1926, and 1931</td>
<td>&quot;poor quality crop, in 1928 and 1936 very good quality crops&quot;</td>
</tr>
</tbody>
</table>

(Source: oral information experiment station Lexington)

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1939</td>
<td>&quot;quality better than 1938&quot;</td>
</tr>
<tr>
<td>1940</td>
<td>&quot;worse than 1939&quot;</td>
</tr>
<tr>
<td>1944</td>
<td>&quot;less cutters and flyers and more heavy grades than year before&quot;</td>
</tr>
<tr>
<td>1947</td>
<td>&quot;high quality&quot;</td>
</tr>
<tr>
<td>1948</td>
<td>&quot;not quite as good&quot;</td>
</tr>
</tbody>
</table>

(Source: Tobacco Situation)

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1943</td>
<td>&quot;quality exceptionally poor&quot;</td>
</tr>
<tr>
<td>1944</td>
<td>&quot;high quality&quot;</td>
</tr>
<tr>
<td>1945</td>
<td>&quot;fair&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1939</td>
<td>&quot;better than 1938&quot;</td>
</tr>
</tbody>
</table>

(Source: Tobacco Situation)
If a reliable quality index could be made available, it is not unlikely that we would find less influence of quality in some later war years than in other years. From 1943-1945 shortages were felt so much that price ceilings were established. Shortage in general, and the fact that price ceilings were in terms of over all season average prices rather than in terms of grades even more, stimulated the demand for lower grades and leveled out partly the normal price differences between higher and lower grades.

Of course there may have been many other causes that made the explanation by means of our correlation analysis only partial. Without doubt some of them were in the field of the general political situation. Others were maybe originated by (temporary) shifts in the bargaining power (degree of concentration) of the market parties.

Those belonging to the former group can be expected to show up as a rule in the residuals of several classes of tobacco simultaneously. Those belonging to the second type also, as far as they were to be found in the demand side of the market, most of the dealers buying in practically all markets, but not as far as they were just changes in the bargaining power of regional farmers' groups.

We might for instance suspect influences of the first group to have worked on the crop of 1941 (1940 for Maryland, Maryland being marketed in the summer after the crop period) and 1946 (in November 1946 a coal strike made prices fall because redrying difficulties arose). One of the second group at the buyers' side: the invasion in to the cigarette market of the so-called economy brand manufacturers (competing with the standard brands) may have caused the upward movement from 1931-1932 (compare Nicholls page 249/50). And the trend in the residuals of the Burley prices from 1921-1926 could be compared with the following short and dramatic history of cooperative selling
activities of the Burley Tobacco Growers Cooperative Association in the early twenties:

<table>
<thead>
<tr>
<th>Year</th>
<th>Ass. receipts as % of total prod.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1921</td>
<td>68.3</td>
</tr>
<tr>
<td>1922</td>
<td>71.3</td>
</tr>
<tr>
<td>1923</td>
<td>72.1</td>
</tr>
<tr>
<td>1924</td>
<td>58.6</td>
</tr>
<tr>
<td>1925</td>
<td>48.8</td>
</tr>
<tr>
<td>1926</td>
<td>41.0, after which year contracts were not renewed.</td>
</tr>
</tbody>
</table>

Source: Micholls p.216  
Tennant p.219

Whether the fact that the fire-cured residuals from 1923-1926 behaved just about the same could also be attributed to such a cause is not known. Of course the same weather and/or disease conditions that caused the bad quality in the Burley crop in 1926 could have played a role in fire-cured prices too, for fire-cured tobacco is grown mainly in the same states as Burley.

6 It is not at all surprising that the A.A.A. legislation did not play much of a role in the statistical explanation of the Maryland prices, for production quotas have never been actually in effect on any Maryland crop. When they were announced by the government, the farmers always voted them down.

9 Years with ceiling prices have not been left out because after all we did use deflated prices and so many articles were under ceilings during the war. It was more interesting to keep them in the series and to see how the residuals worked out during the price regulation years.

*In the same way we find for the Tri State Ass. in the flue-cured area:

<table>
<thead>
<tr>
<th>Year</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1922</td>
<td>35.4% (first year of operation)</td>
</tr>
<tr>
<td>1923</td>
<td>28.5%</td>
</tr>
<tr>
<td>1924</td>
<td>22.8%</td>
</tr>
</tbody>
</table>
| 1925 | 14.6% while contracts were not renewed thereafter.
BIBLIOGRAPHY


21. U. S. Department of Agriculture periodicals:
   Annual Reports on Tobacco Statistics (Prod. and Mark. Adm.)
   The Tobacco Situation (Bur. of Agric. Economics)
   Agricultural Prices (id.)

