AN ANALYSIS OF INTRASTATE TRUCK RATES ON HAULING RAW COTTON IN THE SOUTHEASTERN UNITED STATES

MARKETING ECONOMICS DIVISION
ECONOMIC RESEARCH SERVICE
U.S. DEPARTMENT OF AGRICULTURE

Article Reprinted From
The Marketing and Transportation Situation
May 1965

ERS-237

AN ANALYSIS OF INTRASTATE TRUCK RATES ON HAULING RAW COTTON IN THE SOUTHEASTERN UNITED STATES 1/

In 1963 the Commodity Credit Corporation office in New Orleans surveyed warehouses approved for storage of Government-loan cotton. The information gathered provided the Department with its most complete national cotton traffic flow pattern in over 30 years. 2/ It showed a shift from rail to truck in moving cotton from warehouses in certain Cotton Belt areas, particularly in the Southeast. The motortruck has emerged as the dominant carrier of cotton grown within the Southeast. 3/

Cotton Shipments, Southeastern Region

The Southeastern region includes Alabama, Georgia, North Carolina, and South Carolina--major cotton-milling States accounting about 90 percent of U.S. domestic mill consumption. Thus, most shipments of cotton originating in the Southeast were limited mainly to intrastate hauling and movements within the region. Since most of these were short hauls, trucks were the major carriers, hauling 55 percent of the total shipments originating within the region. In addition, trucks hauled practically all of the Southeastern-produced cotton that was shipped intrastate to mills. Intrastate shipments were extremely heavy in each of the States, ranging from 40 percent of the total shipments originating in Alabama to 84 percent in North Carolina.

Because of their dependence upon truck transportation, this article analyzes motortruck charges for hauling raw cotton within the Southeastern States, except Alabama. Unlike Georgia, North Carolina, and South Carolina, Alabama does not regulate the movements of raw cotton within its borders, so Alabama's truck rates are not available.

Motortruck Rate Structure

Charges for services by motor carriers may be divided into two broad groups: (1) Line-haul rates, the rates charged for hauling freight from origin to destination, and (2) accessorial or ancillary charges, separate charges for additional, special, or supplemental services, although some of these may be included in the line-haul rate.

While there are innumerable accessorial services available to shippers under the line-haul rate systems of motor carriers in the Southeast, there are basically two general types of freight rate structures: Distance-rate structures and group-rate structures. These types overlap, and a particular rate structure may possess characteristics of both types. Both are based on several variables, such as the value of service, weight and density of the commodity, competition, carriers' "costs" of transportation, and service as it relates to distance. However, the precise effects of each of these factors on truck rates are not known. Because freight rates generally tend to increase with distance, linear least squares regressions were developed for each State to estimate the relation between line-haul rates for cotton and distance. In addition, because accessorial services are such an important reason for using trucks to haul cotton, they will also be listed and compared.

1/ Prepared by Joseph R. Potter, Jr., former agricultural marketing specialist, Marketing Economics Division, Economic Research Service, USDA.

2/ Joseph R. Potter, Jr., and Dewey L. Pritchard, "The Traffic Pattern of Raw Cotton Shipped from Warehouses in the United States, 1961-62." Marketing and Transportation Situation, May 1964.

3/ Thirty-three percent of the total U.S. truck shipments of cotton were accounted for by the States within the Southeastern region in the 1961-62 season. Potter and Pritchard, op. cit., p. 34.

North Carolina

In making freight rates and determining rate and tariff policies and practices, motor carriers in North Carolina and South Carolina are aided and their work is coordinated by freight traffic associations of which individual cotton truckers are members. In North Carolina, two traffic associations publish intrastate cotton rates, which are subject to final approval of the State utility commission. 4/ Shippers and carriers generally are in agreement that the association method of ratemaking represents the most practical and orderly procedure for the formulation of rates. Both North Carolina rate associations publish identical line-haul rates on cotton. 5/

North Carolina's line-haul rates on raw cotton are based on a combination distance and group-rate system. The characteristic feature of this group-rate system is the grouping of points of origin and destination surrounding an important city and giving the same rate to and from all points within this group. Groups for ratemaking purposes may include only a city and its surrounding metropolitan area, or the rate group may include many shipping and receiving points in a large geographical area. 6/ In North Carolina, the rate-grouping system is on a county-to-county basis, and the principal base point is the county seat (figure 1). 7/ For example, in Gaston County the county seat is Gastonia, and 40 cities within the county take the Gastonia rates. While differences in distance are partly ignored under this system, usually the more distant groups take higher rates than less distant groups. And because the actual rates are related to the rate base, the transportation cost to the shipper increases with distance. Cotton rates generally lend themselves to this group-rate system since cotton receiving points are clustered together in certain well-defined areas of North Carolina.

To find how rates for hauling cotton vary with distance in North Carolina with its hundreds of origin and destination combinations, it was necessary to use in out least-squares regression an arbitrary number of points based upon data gathered from the flow pattern study. The origins and destinations were determined in the following manner: Warehouses in 30 cities and 20 major cotton milling cities were selected. The 1961-62 flow pattern study showed that over 90 percent of all cotton moved intrastate by truck went through these points. There were 592 point-to-point rates ascertained by this method. 8/ However, because the rate structure is based on the grouping system, these points account for hundreds of additional cities.

4/ The North Carolina Motor Carriers Association, Inc. of Raleigh publishes cotton rates in its local cotton motor freight tariff No. 7-F (N.C.U.C. No. 59). The Motor Carriers Traffic Association, Inc. of Greensboro publishes cotton rates in its local class and commodity motor freight rate tariff No. 3-D (N.C.U.C. No. 33) under item 30050. No individual motor carrier publishes rates on raw cotton.

5/ The North Carolina Utilities Commission prescribed rate base numbers in Docket T-825 Sub 20 of October 5, 1960, effective January 1, 1961. The rate base numbers are based on the shortest mileage between points over which a fully loaded truck could legally travel.

6/ The size of a rate group normally depends on type of traffic and length of haul, and the shape of the group depends on the competitive relations of the cities and towns in the group.

7/ There is an exception to this general rule in that 5 cities (High Point, Rocky Mount, Hatteras, Ocracoke, and Atlantic) take their own rate base. In addition, there are cities, such as Kannapolis, which lie in two counties (Rowan and Cabarrus). However, only one rate basis is used, and in this case it is that for Concord, the county seat of Cabarrus.

8/ From these observations, the average length of haul was found to be 124.7 miles, about what North Carolina officials estimated.

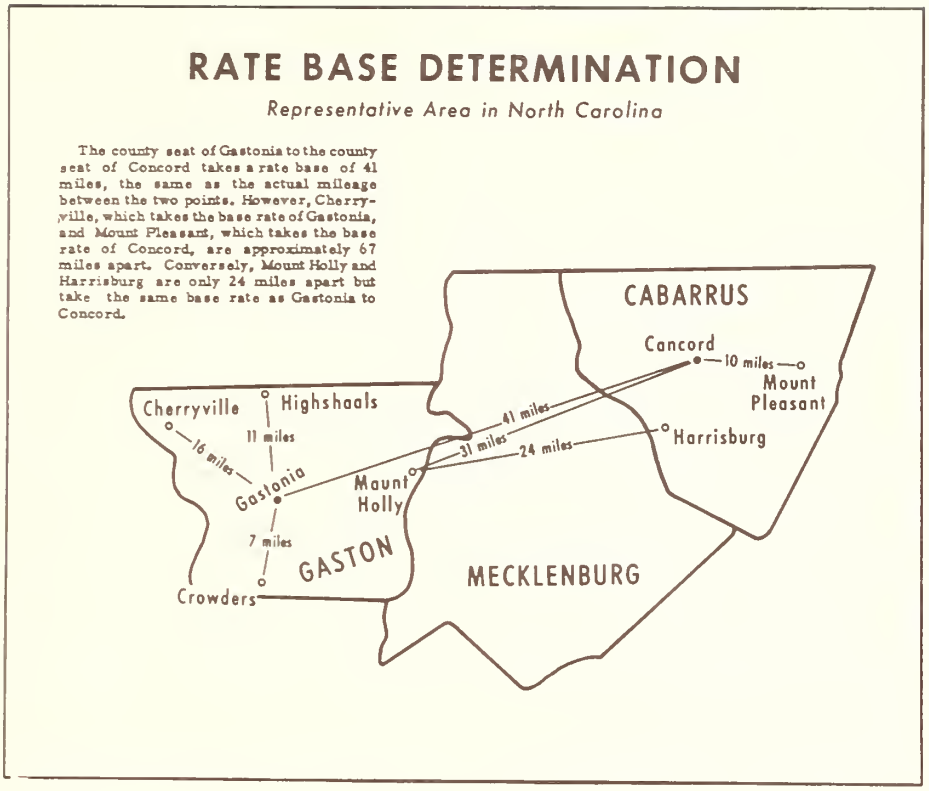

Figure 1

The relation between line-haul rates and distance was derived by the simple regression equation: $Y = a + bX$, where Y is the computed rate in cents per 100 pounds, and X is the distance in miles. The coefficient a represents a base charge that does not vary with distance; the coefficient b shows the increase in the rate for each additional mile hauled (table 7).

All of the correlation coefficients equaled or exceeded 0.976, which indicates a high degree of relationship between distance and rate. The above calculations show the cost advantages gained by shippers on the volume rates. For example, costs per added mile go down (.322 to .135 cent) as the minimum truckload increases. Although the base charge is highest for the 50,000-pound minimum, because of the lower additional charge per mile, the total charge may be lower. Raw cotton which does not have to move great distances is transported throughout the Southeast in the bulky, so-called flat bale. A 25,000-27,000-pound truckload of these flat bales is about the limit, because of their height and width, that one trailer can legally handle. However, shipments in excess of 50,000 pounds and moved on 2 trucks take the 50,000-pound rate. According to State officials this 50,000-pound rate was originally put in to meet rail competition. Only North and South Carolina have these large-volume minimums.

South Carolina

South Carolina's ratemaking procedures are also based on the rate bureau method. However, unlike North Carolina, only one association (The Motor Truck Rate Bureau, Inc., Agent of Columbia, S. C.) published intrastate rates on raw cotton.

South Carolina's line-haul truck rates are also based on a combination distance and group-rate systems. However, in contrast to North Carolina's extensive use of rather large geographical areas in its group rate system, South Carolina uses only a base city and the surrounding area. Nevertheless, mileages from some

Table 7.--Regression coefficients for calculation of line-haul rates per 100 pounds of raw cotton, North Carolina

Size	Base rate (a)	Increase per added mile (b)
	Cents	Cent
Less-than-truckload 1/	9.86	0.322 (±.003)
15,000-pounds truckload minimum weight	8.84	.184 (±.001)
25,000-pounds truckload mimimum weight	7.95	.168 (±.001)
50,000-pounds volume minimum weight	10.03	.135 (±.001)

1/ Example: Rate = Base rate + increase per added mile times mileage. Hence, for a 100-mile shipment, the LCL rate = 9.86 + 0.322 x 100 = 42 cents.

shipping points and their base points are considerable. For example, the town of Manning takes Sumter as its rate base point, although it is 19 miles away. While all of North Carolina's rate base numbers were originally based on highway mileage between county seats, South Carolina initially used the old Short Line Railroad mileage system. These basing numbers have now been adjusted more closely to the actual highway mileage, although one can still see the influence of the railroad system. For example, the city of St. George takes Pregnall as its base point, and Beaufort takes Coosaw as its base point. Yet, these base points are not on State highway maps because they are only old railroad junction points. Other rail-oriented pecularities also persist. The more distant points normally take a higher rate base than less distant points, although the mileage relationship is not as pronounced as in North Carolina. This indicates greater competition between rival producing centers to sell goods in a common market.

Although there is only one rate association in South Carolina, 2 separate line-haul rate schedules are published within the one tariff. One set of rates under item 2440 (S.C.P.S.C.-MF No. 90) applies to all but 8 motor carriers. These 8 carriers take another set of rates under item 2445 of the same tariff, except when raw cotton is being moved from a State or Federal warehouse. Then the rates shown in item 2440 will apply for 4 of these 8 carriers. Alghough the majority of motor carriers under item 2440 publish rates ranging from LTL shipments to truckload volumes of 50,000 pounds, these 8 carriers compete in only the 15,000- and 20,000-pound levels of rates. In addition, they compete in a more limited geographical area than the majority, and their rates are somewhat higher. Except for one carrier in Georgia, South Carolina publishes the only rates for 20,000-pound loads in the 3 States. Rates and distances for a selected number of origins and destinations were used in a linear regression analysis to determine the average relation between charges and distance (table 8). 9/ Whereas 20 major cotton milling cities were again used, only 15 warehouse cities were needed. According to the 1961-62 survey, approximately 90 percent of all South Carolina's cotton that moved intrastate by truck went through these selected points. All of the correlation coefficients equaled or exceeded 0.938.

Georgia

Georgia's raw cotton, unlike that of North and South Carolina, moves under a dual truck-tariff system. Most eligible

9/ Distances for 291 origin-destination combinations indicated that the average haul in South Carolina was 96.4 miles.

Table 8.--Regression coefficients for calculation of line-haul rates, per 100 pounds of raw cotton, South Carolina

Size	Most carriers 1/		All other carriers 2/	
	Base rate (a)	Increase per added mile (b)	Base rate (a)	Increase per added mile (b)
	Cents	Cent	Cents	Cent
Less-than-truckload	9.51	0.322 (±.005)	---	---
15,000-pound truckload minimum weight	8.94	.228 (±.004)	15.03	0.274 (±.004)
20,000-pound truckload minimum weight	7.61	.200 (±.003)	14.98	.202 (±.002)
25,000-pound truckload minimum weight	6.62	.190 (±.003)	---	---
50,000-pound volume minimum weight	7.29	.169 (±.003)	---	---

1/ Carriers hauling under item 2440 of S.C.P.S.C. Tariff MF-No. 90.
2/ Carriers hauling under item 2445 of S.C.P.S.C. Tariff MF-No. 90.

truckers haul raw cotton under a commodity tariff published by the Georgia Public Service Commission. However, 17 independent motor carriers publish separate cotton tariffs approved by the Commission.

Line-haul rates published both by the State and the 17 independent motor carriers are strictly mileage or distance rates. That is, a rate is published to apply for a specified distance or a distance falling within specified mileage blocks. Thus, in this respect it differs from a specific rate, which applies between named stations. These rates increase more or less proportionately with the distance the freight is hauled. Except for the cities immediately around Atlanta and Augusta, there are no rate groupings in Georgia such as those in the Carolinas.

For convenience in constructing rate schedules, Georgia uses zones. Cotton rates are established for blocks of 5 miles, and move progressively into 10-mile and then 20-mile increments.

A regression analysis was used to measure the average relation between truck rates published by the Commission and distance (table 9). 10/ The three correlation coefficients equaled or exceeded 0.994, the highest of the 3 States.

Each of the 17 independent carriers has its own rate structure. Rates of most of these carriers for movements of the same distance vary only a few cents per 100 pounds. However, rates of some firms are relatively low for short distances and increase rapidly with distance, while rates of other carriers are higher for short hauls but increase little with distance.

Comparison of Line-Haul Charges

Motortruck line-haul charges per hundredweight for moving raw cotton within the 3 Southeastern States increase as distance increases. Figure 2 and table 10 show State rates for varying distances calculated by regression equation. These

10/ Because of the lack of a set number of observations, such as that used in North and South Carolina, the average length of haul could not be calculated. However, it would be within a range of 0 to 200 miles.

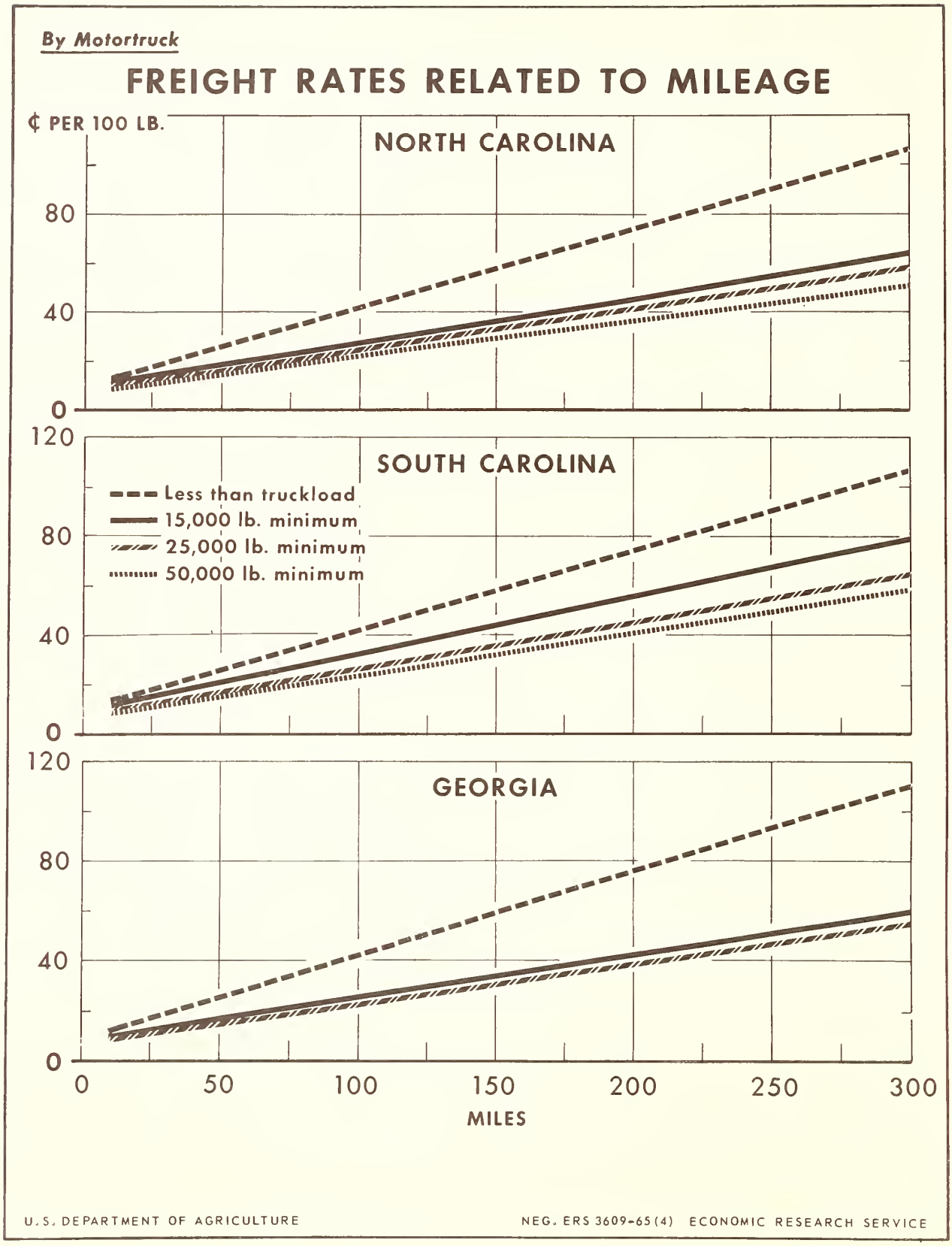
By Motortruck
FREIGHT RATES RELATED TO MILEAGE
¢ PER 100 LB.
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
Less than truckload
15,000 lb. minimum
25,000 lb. minimum
50,000 lb. minimum
0
40
80
120
0
50
100
150
200
250
300
MILES
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 3609-65(4) ECONOMIC RESEARCH SERVICE

Figure 2

Table 9.--Regression coefficients for calculation of line-haul rates per 100 pounds of raw cotton, Georgia

Size	Base rate (a)	Increase per added mile (b)
	Cents	Cent
Less-than-truckload	8.93	0.338 (±.003)
15,000-pound truckload minimum weight	9.11	.170 (±.002)
25,000-pound truckload minimum weight	7.57	.158 (±.002)

are not necessarily actual rates; particular rates for movements from one point to another may be somewhat different.

Less-than-truckload rates for equal distances are about the same in North and South Carolina. These rates tend to increase slightly more with distance in Georgia than in the Carolinas. Truckload rates are highest in South Carolina, except those for 50,000-pound loads hauled relatively short distances. Georgia's rates for 15,000- and 25,000-pound minimum weight loads are the lowest. Georgia does not have rates for the 50,000-pound load.

While each State has an ascending rate scale, there are nevertheless several differences in their structures. For example, the spread between Georgia's 15,000- and 25,000-pound minimum rate is much closer at a given distance than that of South Carolina.

The enormous number of line-haul rates and accessorial services and charges in existence today result mainly from special and piecemeal attempts to adjust rates and services to numerous individual situations and problems. No where is this more apparent than in the motor carrier freight rate structure on raw cotton within the Southeast.

Comparison of Accessorial (Additional) Services and Charges

Southeastern motor carriers offer many special services to accommodate shippers. These services, for which there is usually a charge, are provided for in the carriers' tariffs. Table 11 lists the various services and charges by the motor carriers in the 3 States. For a more detailed accounting, the reader may consult the various tariffs cited in the footnotes.

Several services and charges are common to the 3 States, but significant variations have developed because of the varying competitive conditions within each State. For example, all 3 States provide for a stop-off en route privilege, but in each State the number allowed and charges made vary. Paradoxically, some carriers actually offer services and charges that are designed to discourage a particular movement. For instance, a Georgia carrier charges a flat $25 for detention of equipment, whereas most Georgia carriers offer a free time allowance and a $4 to $6 per hour charge. Furthermore, the main reason for the wide gaps in services and charges among the various States is that some agencies publish their cotton rates in general commodity tariff while the others publish a special cotton commodity tariff. In other words, services and charges are geared to the movement of many other commodities beside cotton. Nevertheless, the rates and services, where applicable, must by law, be applied regardless of the commodity.

Table 10.--Line-haul rates per 100 pounds of raw cotton, calculated from regression equations, North Carolina, South Carolina, and Georgia

Length of haul	North Carolina				South Carolina 1/				Georgia		
	Less than truck-load	15,000 lb. (minimum)	25,000 lb. (minimum)	50,000 lb. (minimum)	Less than truck-load	15,000 lb. (minimum)	25,000 lb. (minimum)	50,000 lb. (minimum)	Less than truck-load	15,000 lb. (minimum)	25,000 lb. (minimum)
Miles	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
50	26	18	16	17	26	20	16	16	26	18	15
100	42	27	26	24	42	32	26	24	43	26	23
150	58	36	33	30	58	43	35	33	60	35	31
200	74	46	42	37	74	55	45	41	77	43	39
250	90	55	50	44	90	66	54	50	93	52	47
300	106	64	58	51	---	---	---	---	110	60	55

1/ Rates calculated for item 2440 carriers only; calculated rates for item 2445 carriers would be higher. Rates for 20,000 lb. minimum load (item 2440) are not shown.

Less than truckload:	Y = 9.86 + .322X	Y = 9.51 + .322X	Y = 8.93 + .338X
15,000 lbs. minimum:	Y = 8.94 + .184X	Y = 8.94 + .228X	Y = 9.11 + .170X
25,000 lbs. minimum:	Y = 7.95 + .168X	Y = 6.62 + .190X	Y = 7.57 + .158X
50,000 lbs. minimum:	Y = 10.03 + .135X	Y = 7.29 + .169X	

Table 11.--Accessorial services and charges applying on southeastern intrastate raw cotton traffic

Services	North Carolina		South Carolina	Georgia	
	North Carolina Motor Carriers Association, Inc.	Motor Carriers Traffic Association, Inc.		Public Service Commission	Individual cotton trucker tariffs
	Charges 1/	Charges 2/	Charges 3/	Charges 4/	Charges
1. Stop-off en route	8½ per 100 lb. 5/	10¢ per 100 lb. 6/ X/	$5.00 per stop 7/	50¢ per bale 8/	Range - 8½¢ per 100 lb. to $6.00 per stop 9/
2. Diversion and reconsignment	$3.03	$3.03	$3.36	N/S	N/S
3. Detention and equipment	N/S	$2.00 for each 30 minutes	$2.00 for each 30 minutes	N/S	Range - $4.00 to $6.00 per hour
4. Vehicles provided but not used	N/S	30¢ per mile X/	N/S	N/S	Range - 20¢ to 40¢ per mile
5. Handling freight at position not immediately adjacent to the truck	N/S	25¢ per 100 lb. X/	25¢ per 100 lb. X/	N/S	N/S
6. Redelivery service	N/S	14¢ per 100 lb. X/	25¢ per 100 lb. X/	N/S	25¢ per 100 lb. X/
7. Storage	N/S	3¢ per 100 lb. for first 5 days-5¢ per 100 lb. thereafter X/	6¢ per 100 lb. X/	N/S	N/S
8. Loading and unloading vehicles	N/S	N/S	25¢ per 100 lb. X/	N/S	Range - 25¢ to 50¢ per bale
9. Off-route stop-offs of deliveries	N/S	N/S	N/S	N/S	Range - 35¢ to 50¢ per mile
10. Furnishing extra driver	N/S	N/S	N/S	N/S	15¢ per mile

1/ For a more detailed accounting of the services and charges, see the North Carolina Motor Carriers Association, Inc., Tariff No. 7-F (N.C.U.C. No. 59).

2/ For a more detailed accounting of the services and charges, see items 100011, 100015, 100020, 100070, 100071, 100072, 100080, 100110, and 100130 of the Motor Carriers Traffic Association's, Inc., (Local Class and Commodity Motor Freight Rate Tariff No. 3-D N.C.U.C. No. 33).

3/ For a more detailed accounting of the services and charges, see items 55, 70, 71, 72, 73A, 85A, 90A, and 2440, Motor Truck Rate Bureau, Inc. Agent Joint and Local Commodity Rate Tariff No. 2-L (S.C.P.S.C. MF-No. 90).

4/ For a more detailed accounting of the services and charges, see the Georgia Public Service Commission Commodity Tariff No. 1 (G.S.P.C. MF-No. 9).

5/ 3 stops allowed - exclusive of the original pickup.

6/ 3 stops allowed - exclusive of the final delivery.

7/ 3 stops allowed - excluding initial pickup and final delivery.

8/ 5 stops allowed.

9/ Range of stop-offs: 3 to no limit.

X/ Subject to either a minimum or maximum charge.

N/S No service or charge is provided in the tariff.