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Motor Carrier Freight Classification and Costs of Providing Transportation Services

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The Interstate Commerce Commission is currently conducting an investigation of the motor carrier classification system. One aspect of this investigation centers on whether the factors used to categorize shipments by different rate classifications significantly impact the costs incurred by motor carriers in providing transportation services. This paper presents the results of several multiple-regression analyses on data collected by the Interstate Commerce Commission for use in motor carrier cost studies. The regression analyses provide an indication of the factors that cause differences in motor carrier costs. Conclusions are drawn about these factors and their effects on the costs incurred by motor carriers in providing transportation services.

The Interstate Commerce Commission (ICC) recently completed an investigation into the possible restructuring of motor carrier less-than-truckload (LTL) shipment rates (1). One finding of this investigation was that a number of parties to the rule-making proceeding criticized the current motor carrier classification system. Criticisms levied against the classification system included excessive complexity and the use of factors to classify shipments that have minor impact on transportation cost.

It is well known that the National Motor Freight Classification (NMFC), which is used by all general commodity motor carrier rate bureaus except those providing primary service in New England, is essentially a copy of the railroad's Uniform Freight Classification. The shipment characteristics used by the NMFC to determine the class ratings for individual commodities are shipment density, liability to damage, liability to damage other commodities with which it is transported, perishability, liability to spontaneous combustion or explosion, susceptibility to theft, value per kilogram compared to other articles, ease or difficulty in loading or unloading, stowability, excessive weight, excessive length, care or attention necessary in loading and transporting, trade conditions, value of service, and competition with other commodities transported. In contrast to these characteristics the Coordinated Classification used by New England-area motor carriers uses only the characteristics of shipment weight and density to determine a shipment's class rating. Schuster (2) and Winship (3) have also shown that the NMFC permits extensive internal cross-subsidies to occur between shipments of different weights, class ratings, and those that are moved in different traffic lanes.

The purpose of this paper is to determine whether the factors used to place shipments in different rate classifications are related to the costs incurred by the general freight motor carrier in providing transportation services. First, an overview of the ICC's motor carrier cost model is presented. Second, research findings that indicate factors causing differences in motor carrier costs are presented. Finally, conclusions are drawn as to whether factors used in the classification process affect the costs incurred by motor carriers in providing transportation services.

ICC MOTOR CARRIER COST MODEL

The ICC model of the general freight motor carrier firm (4) postulates four major sets of activities required to accomplish intercity freight movements: (a) line haul (intercity movement), (b) pickup and delivery, (c) terminal platform handling, and (d) billing and collection. The activities—with the exception of billing and collection—undertaken by motor carriers to effect commodity movements include loading on truck at shipper's dock, unloading at terminal to cart, loading highway trailer from cart, unloading highway trailer at destination terminal, loading city delivery truck, unloading delivery truck at consignee's dock, unloading at break bulk terminal, and loading on another trailer for destination terminal. Break bulk terminal adds two more stage handlings, and interlining adds at least four more handlings.

The ICC cost methodology uses two formulas, Highway Forms A (5) and B (6), to estimate the costs of motor carrier freight movements. The formulas postulate that motor carrier costs are primarily a function of shipment weight and density. In other words, the ICC motor carrier cost formulas assume that, for shipments of equal weight, shipment density is a major determinant of the differences of the variable costs experienced in handling individual shipments. Thus, of the 15 factors used in the rate classification process, the ICC motor carrier cost formulas use only one factor—shipment density—as a major explanatory variable of differences in motor carrier variable costs.

FACTORS IN MOTOR CARRIER COSTS

Alternative Cost Methodology

An alternative methodology, which is described in greater detail elsewhere (7,8), can be used to cost motor carrier transportation services. This methodology is similar to the ICC's cost methodology in two major aspects: (a) its use of the line-haul, pickup and delivery, terminal platform handling, and billing and collection activities as major cost centers of the motor carrier firm and (b) its use of demand and operational data gathered from motor carrier firms to parameterize the motor-carrier-firm cost model.

The methodology differs, however, from the ICC's motor carrier cost methodology in three key areas:

1. The methodology focuses on determining the variable costs attributable to specific shipments to a greater extent than the ICC's cost methodology, which focuses to a higher degree on determining systemwide average costs.
2. The cost methodology uses many factors, including the number of pieces comprising a shipment and urban congestion, to explain motor carrier costs in addition to shipment weight and density, which are included in the ICC motor carrier cost formulas.
3. Sophisticated computer-based statistical techniques, primarily multiple-regression analysis, are used throughout the cost methodology; however, the ICC motor carrier cost methodology is, except for the sampling of carrier demand and operational data, essentially a manual procedure.

Data Base

The data base used to analyze motor carrier costs consisted of (a) demand and operational data obtained by the ICC for use in its 1971 territorial motor carrier cost studies (9-12) and (b) the shipment platform handling data obtained by the ICC in its recent platform study (13). The cost study data provided information on the weight, traffic type, and number of shipments in 13 weight brackets; the operational characteristics of pickup and delivery trips and data on the shipments handled on each trip; the operational characteristics of line-haul trips and the weight of the shipments handled on each trip; and the frequency with which shipments that are members of various weight brackets and traffic types are handled over the terminal platform.

The shipment platform handling data contained information on individual shipment characteristics, the time required to handle shipments over the platform, and the means used to handle individual shipments over the terminal platform. The following sections discuss the factors that affect motor carrier costs in the platform handling, pickup and delivery, and line-haul cost centers.

Factors Affecting Platform Handling Costs

Multiple regression analysis was used to analyze the platform handling data collected in the ICC's 1969-1970 platform study. The methodology used to conduct the analysis and the results of the analysis are reported more completely in studies by Schuster and others (7, 14).

Table 1 shows the variables that the multiple regression analyses indicated affected platform handling time for shipments handled over the platform manually and by dragline and also by forklift. The multiple-regression analyses permit the following conclusions to be drawn relative to the factors that significantly impact shipment platform handling time and, therefore, shipment platform handling costs:

1. The factors that affect shipment platform handling time differ depending on whether the shipment is handled manually or by forklift. Thus, the handling time function for unitized (containerized or palletized) shipments is different from the platform handling time function for nonunitized shipments.
2. For shipments handled manually, the major determinants of shipment platform handling time are the number of pieces comprising the shipment and the distance the materials handling equipment moved the shipment across the terminal platform.
3. For shipments handled by forklift, the number of trips made by forklift across the platform and the total distance the forklift moved are the major determinants of shipment platform handling time.
4. The factors of shipment weight and density, which are used in the ICC motor carrier cost formulas to determine platform handling costs, have relatively little impact on shipment platform handling time. Shipment density becomes important only when it exceeds 480 kg/m^3 (30 lb/ft^3). The ICC platform study contains the most recent data in the public domain on shipment density. Table 2 contains the proportions of shipments in various shipment density classifications. Table 2 indicates that the platform handling times of less than one-third of all shipments are affected by shipment density.
5. The size of the terminal dock will also affect shipment platform handling time.
6. Shipment platform handling strategies (defined in terms of materials handling equipment used, cross-docking, and so forth) used for shipments in different weight brackets have a significant impact on the time required to handle shipments over the terminal platform.
7. The data support the conclusion that the time required to handle shipments, on a per unit of weight basis, differs for shipments in different weight brackets. There are significant economies of scale realized in handling shipments in the heavier weight brackets, particularly if the shipment is unitized.

Factors Affecting Pickup and Delivery Costs

A pickup and delivery trip can be disaggregated into the time spent at each stop (stop time) and the time and distance spent traveling to and from the terminal and between each stop (running time and distance traveled). Consequently, pickup and delivery trips can be measured in terms of the time and distance required to complete each trip.

It is helpful to understand the ICC's pickup and delivery cost model in order to contrast it with the re-

Table 1. Variables that impact shipment platform handling time.

Variable	Shipment Handling Method: Forklift	Manual
Number of pieces in the shipment		X
Shipment weight		X
Shipment volume		X
Shipment density		X
Distance moved over platform	X	X
Number of trips across platform	X	
Truck-to-truck movement[a]	X	X
Platform-to-truck movement[a]		X
Four-wheel hand truck used to move shipment[a]		X
Interchange receiving shipment[a]	X	

[a] A qualitative, or dummy, variable.

Table 2. Percentage distribution of shipments in various shipment density classifications.

Shipment Density Classification (kg/0.3 m^3)	Shipments Handled by Forklift (%)	Shipments Handled by Means Other than Forklift (%)	All Shipments (%)
0-2.24	3.27	10.44	9.58
2.25-4.49	13.45	18.99	18.33
4.50-6.74	11.64	14.84	14.45
6.75-8.99	7.27	10.34	9.97
9.00-13.49	15.64	14.39	14.54
13.50-17.99	14.91	10.48	11.01
18.00-26.99	14.18	11.37	11.71
27.00 and over	19.64	9.15	10.40

sults of the cost analysis reported in this paper. The ICC model assumes that pickup and delivery trip stop time is a linear function of the number and weight of the shipments handled at each stop. This relation is applied to the total stop time for the shipments belonging to each of 13 shipment weight brackets to obtain an average stop time per 45 kg (100 lb) for each weight bracket. Any variation of actual stop time from average stop time is assumed to be a function of shipment density. A set of density adjustment ratios is determined that allocate stop time variations to shipments in various density classes.

Pickup and delivery trip running time and distance traveled are assumed to be a function of the number of stops made in each pickup and delivery trip. Variations in the number of stops made in a pickup and delivery are assumed to be partially explained by shipment density. Average pickup and delivery distance traveled per trip is divided by average pickup and delivery trip running time to obtain an average vehicle speed that can be used to estimate the running time and distance for trips with specified number of stops.

The ICC model assumes pickup and delivery trip stem running time and distance traveled, i.e., the time (distance traveled) from the terminal to the first stop and from the last stop to the terminal to be a constant, regardless of the characteristics of the locality in which the trip was made. Consequently, the model computes the average stem running time and distance traveled and allocates it to shipments in each weight bracket on the basis of the ratio of the total weight of the shipments in each weight bracket to the total weight of the shipments in all weight brackets.

The ICC's cost methodology contends that shipment density is a major factor in the determination of pickup and delivery costs. In order for shipment density to be a major factor affecting pickup and delivery trip distance traveled and running time, pickup and delivery vehicles would have to be filled to their cubic capacity prior to reaching their maximum weight limitation a substantial portion of the time. However, McDermott's study of urban pickup and delivery operations (15) indicates that the typical vehicle engaged in pickup and delivery operations uses a low percentage of its available cubic capacity.

Further evidence on the degree of vehicle capacity use can be found in ICC documents. Carriers participating in ICC territorial cost studies submit a Field Report of Highway Form A, which contains information on the rated load capacity and cubic capacity of their line-haul, peddle-trip, and pickup and delivery vehicles. A vehicle's rated load capacity is the weight of a typical mix of shipments that will fill a vehicle's available cubic capacity. Thus, the rated load capacity considers shipment density because the carrier must consider the density of a typical shipment in making such a determination. It was believed that the rated load capacity of pickup and delivery vehicles would be a conservative measure of the weight that could be carried in the typical pickup and delivery vehicle.

The ratio of the mean total weight of the shipments delivered to the mean rated load capacity measures the utilization of the vehicle's available capacity when the vehicle departs the terminal. The ratio of the mean total weight of the shipments picked up to the mean rated load capacity measures the vehicle's capacity utilization on the vehicle's return to the terminal. Because motor carriers generally make deliveries prior to pickups, the degree of capacity utilization during a pickup and delivery trip will decline as deliveries are made and increase as pickups are made. Thus, the greater of the pickup or delivery mean capacity utilization statistics can be viewed as the maximum mean capacity utilization of the vehicle during the entire pickup and delivery run. The data shown in Table 3 were developed using this logic. The data in Table 3 indicate that the highest mean capacity utilization is 53.05 percent in the New England II cost territory. The data also indicate that, if pickups were made prior to deliveries, the mean capacity utilization of pickup and delivery vehicles would not on the average be exceeded.

If shipment density does affect pickup and delivery running time and distance traveled, the cubic capacity of pickup and delivery vehicles would have to be filled before all of the stops that could be made on the trip could be accomplished. Unfortunately, data are unavailable on the variance of rated load capacity. An approximation of the probability of filling the pickup and delivery vehicle, prior to making all of the stops that could have been made on the trip, can be computed assuming that the mean rated load capacity is fixed and computing the probability, on the average, of exceeding the mean rated load capacity. This was accomplished by using a one-tailed test (the right tail of the distribution curve) and assuming that the distributions of shipment weights picked up, delivered, and total shipments handled on the trip were normally distributed. These probabilities are shown in Table 3. Using the maximum probability for either shipments picked up and delivered (from Table 3), it appears that shipment density will impact pickup and delivery running time and distance traveled costs in only 21.51 percent of the pickup and delivery trips.

Does shipment density affect pickup and delivery stop time? An answer to this question can be obtained by viewing the results of the A. T. Kearney study (16). It shows that the motions required to load and unload shipments at the stop are similar to the motions required to handle freight on the terminal platform. Consequently, the results of the analysis of shipment platform handling time are applicable to pickup and delivery stop time.

Table 3. Use of pickup and delivery vehicle capacity in nontrailer drop runs.

	Related Load Capacity Use					
	Pickups		Deliveries		Total Shipments Handled in Run	
Cost Territory	Average Use (%)	Probability Vehicle Filled	Average Use (%)	Probability Vehicle Filled	Average Use (%)	Probability Vehicle Filled
New England I	33.86	0.1151	46.53	0.1727	79.67	0.4254
New England II	43.76	0.1641	53.05	0.2151	96.81	0.4836
Central	36.01	0.1050	52.76	0.2000	88.16	0.4354
Eastern-Central	28.40	0.0337	38.35	0.0589	66.56	0.2640

Table 4. Variables that impact pickup and delivery trip time and distance traveled.

	Pickup and Delivery Trip Component		
Variable	Distance Traveled	Running Time	Stop Time
Number of stops	X	X	
Participant in New England II region cost study[a]	X	X	X
Distance traveled during trip		X	
Urban area population[a]	X	X	X
Whether trip involved a trailer drop[a]			
Time of day when trip was made[a]		X	X
Shipment weight			X
Number of shipments			X
Stop made at carrier's terminal[a]			X
Stop made at freight forwarder[a]			X
No shipment or pallet pickup[a]			X
Stop is a delivery[a]			X
Participant in Eastern-Central territory cost study[a]	X	X	X

[a]A qualitative, or dummy, variable.

Shipment density primarily impacts shipments that are (a) handled manually at the stop and (b) whose density is 480 kg/m^3 (30 lb/ft^3) or more. The majority of these shipments are in the upper less-than-truckload (LTL) and truck-load (TL) weight brackets.

In summary, shipment density appears to have little effect on pickup and delivery costs. If shipment density has little effect, what factors impact pickup and delivery costs? This question was answered by analyzing the pickup and delivery trip data collected by the ICC for its 1971 territorial cost studies. Three multiple regression analyses were performed using the pickup and delivery trip data. The methodology used to conduct the analyses and the results of the analyses are reported by Schuster and others (7, 17). Table 4 shows the variables that the multiple regression analyses indicated affected pickup and delivery trip distance traveled, running time, and stop time.

The regression analysis of pickup and delivery trip distance traveled indicated that (a) the number of stops made on the trip, (b) the population of the urban area in which the trip was made (a proxy for urban area size and congestion), and (c) whether the carrier is a long-haul (Eastern-Central cost study carriers) or short-haul carrier (other 1971 cost study carriers) were major factors impacting trip distance traveled. The regression analysis also showed that there were discontinuities and changes in the slope of the variable "number of stops."

The multiple regression analysis of pickup and delivery trip stop time indicated the following as affecting pickup and delivery stop time:

1. The factor that the regression analysis showed had the greatest impact on pickup and delivery stop time was shipment weight. The regression analysis showed that shipment weight provided an explanation of more than 50 percent of the variation in pickup and delivery stop time. Because shipment handling time at each stop is the major determinant of pickup and delivery stop time, it was believed that shipment weight in this model acted as a proxy variable for a host of other shipment factors considered the real determinants of pickup and delivery stop time. These factors have been presented in the discussion of shipment platform handling time and include the number of pieces comprising the shipment, shipment density, the distance the shipment was moved on the consignee's-consignor's dock, whether the shipment was palletized or containerized, the type of materials handling equipment used at the stop, and so forth. Consequently, it appears that data should be recorded and analyzed on these factors and shipment weight in order to better explain the determinants of pickup and delivery stop time.

2. The number of shipments handled at each stop significantly affected pickup and delivery stop time. Because this variable represented freight bill processing time, significant economies in stop time can be achieved by consolidating several smaller shipments into a single large shipment.

3. The population of the urban area in which the stop was made had a significant impact on pickup and delivery stop time. Because the equation's intercept term can be interpreted as the mean waiting time for the vehicle to receive a space at the dock where the stop was made, the value of the intercept is a measure of the typical vehicular congestion at shipping and receiving docks in urban areas of different populations. In general, it can be concluded that pickup and delivery stop times are longer in urban areas that have populations greater than 500 000.

4. The regression analysis of pickup and delivery stop times showed that pickup and delivery stop time per unit of weight declined as shipment weight increased. Thus, significant economies can be realized by carriers if shippers adopted transportation service strategies that increased average shipment weight (e.g., shipment consolidation and multiple shipment tender). In addition, it showed that pickup and delivery stop times vary by the population of the urban area in which the stop is made, the time of the day at which the stop was made, whether the shipper is a carrier or a freight forwarder, whether the stop involves pickups or deliveries, and whether the carrier was a long- or short-haul carrier.

The regression analysis of pickup and delivery trip sample data has several implications for rate making. First, many of the current factors used in the rate classification process have little, if any, impact on pickup and delivery costs. In particular, shipment density appears to have much less impact on pickup and delivery costs than is assumed by both the classification process and the ICC motor carrier cost formulas.

Table 5. Pickup and delivery performance factors and costs, Eastern-Central Territory, by urban area population category, 1978.

Performance Factors/Costs	Urban Area Population 100 000-249 999	250 000-499 999	1 000 000-2 499 999	2 500 000-4 999 999	5 000 000 and over
Stem distance traveled (km)	25.245	30.721	39.247	43.010	49.202
Distance traveled between stops (km)	26.108	32.686	40.490	44.462	46.378
Total distance traveled (km)	51.353	63.407	79.737	87.472	95.580
Stem running time (min)	65.800	70.245	100.243	109.391	124.534
Running time between stops (min)	68.050	75.975	103.417	112.849	117.386
Stop time (min)	210.789	220.441	241.635	262.689	273.754
Total time (min)	344.639	366.661	445.295	484.929	515.674
Variable distance costs ($)	9.783	11.984	15.191	16.681	18.209
Variable time costs ($)	47.738	50.789	61.681	67.171	71.429
Total variable costs ($)	57.521	62.773	76.872	83.852	89.638
Cost/45 kg ($)	0.297	0.324	0.397	0.433	0.463
Minimum variable costs (%)	100.00	109.13	133.64	145.78	155.84

Note: 1 km = 0.6 mile, 1 kg = 2.2 lb.

Table 6. Percentage of single-line LTL shipment costs by cost center, 1971.

Shipment Weight (kg)	Cost Study Territory: Central Region Platform Handling	Pickup and Delivery	Line Haul	Billing and Collection	Total[a]	Eastern-Central Territory Platform Handling	Pickup and Delivery	Line Haul	Billing and Collection	Total[a]
0-66	16.18	64.17	6.19	13.46	100	25.05	56.32	8.91	9.72	100
67-134	19.67	57.47	12.09	10.76	100	29.19	47.17	16.34	7.30	100
135-224	21.90	51.35	17.82	8.93	100	31.05	40.10	22.98	5.87	100
225-449	21.18	47.21	24.49	7.12	100	36.92	31.82	27.24	4.02	100
450-899	20.13	40.92	33.94	4.99	100	31.64	26.25	39.22	2.88	100
900-2249	17.62	32.82	46.41	3.15	100	28.44	19.32	50.51	1.73	100
2250-2699	8.99	27.59	61.29	2.23	100	15.87	16.94	65.99	1.20	100
2700-4499	9.40	24.16	64.82	1.62	100	16.50	14.56	68.07	0.87	100

Note: 1 kg = 2.2 lb.
[a]Totals may not add to 100 percent due to rounding errors.

Second, urban congestion has a major impact on pickup and delivery trip costs. Table 5 contains some selected operational and cost data for a 10-stop pickup and delivery trip by an Eastern-Central territory carrier involving 14 LTL shipments in five selected urban area population categories. The data show that pickup and delivery costs in urban areas with more than 5 million population are more than 50 percent higher than pickup and delivery costs in urban areas in the 100 000-249 999 population category. The data also show that the mean pickup and delivery trip takes more than eight hours to complete in the most heavily populated urban areas, even though the pickup and delivery vehicle experiences a load factor of less than 50 percent utilization of rated weight capacity.

Third, the multiple regression analysis of pickup and delivery data clearly supports the use of multiple tender rates as a means of reducing pickup and delivery costs. Finally, the data support the possibility of carriers offering lower rates if pickups and deliveries are made during hours other than the normal working day.

Factors Affecting Line-Haul Costs

Two major factors affect line-haul costs: shipment density and line-haul load factor. Because freight rates are quoted on the basis of shipment weight, shipment density is a major factor in determining the proportion of line-haul costs that should be allocated to individual shipments. Shipment density affects line-haul costs because the density of the commodity determines the total weight of the commodity that can be loaded on a line-haul vehicle. As long as the commodity's density is sufficiently high so that the vehicle's maximum weight limitation can be equalled or exceeded by a vehicle load of a commodity, shipment density is a neutral factor and the ratio of shipment weight to traffic-lane load factor or maximum weight limitation can be used in allocating line-haul costs to individual shipments. If the commodity's density is such that a vehicle load of the commodity will not exceed the vehicle's maximum weight limitation, the ratio of the space occupied by the commodity to the total space available, or the space occupied by shipments of neutral density at traffic-lane load factor, can be used in allocating line-haul costs to individual shipments.

Line-haul load factor affects line-haul costs. In general, the higher the line-haul load factor, the lower the costs of moving a shipment of constant weight. The major problem with the ICC's line-haul cost methodology is that it assumes line-haul load factors are constant in all traffic lanes. Knowledgeable observers of the motor carrier industry know that this assumption is false because there are significant variations in load factor between traffic lanes. Thus, if a carrier routes traffic through his network of routes so as to achieve relatively high load factors in all traffic lanes, the carrier's costs will be significantly lower than a carrier that has significant variations in load factors between traffic lanes.

Variable Costs by Shipment Weight

The preceding sections of this paper have discussed the factors that affect motor carrier costs in three of the four motor carrier cost centers. Costs in the fourth cost center, billing and collection, were not discussed, as they are generally assumed to be constant for shipments of a given traffic type. This section discusses how the proportion of total variable costs that can be attributed to each cost center vary by shipment weight.

Table 6 shows the proportion of single-line LTL shipment variable costs by cost center for eight LTL shipment weight brackets. Three major conclusions can be drawn from the data displayed in Table 6. First, shipment density has relatively little effect on the costs associated with smaller LTL shipments. As the analysis of the individual cost centers indicated, shipment density primarily affects line-haul costs. Line-haul costs become relatively important only when shipment weight exceeds 900 kg (2000 lb).

Second, shipment density has a relatively large impact on the costs associated with shipments weighing in excess of 900 kg. In fact, in the case of TL shipments that require no platform handling services, shipment density and load factor are the major factors affecting shipment variable costs. Finally, factors that affect terminal costs, e.g., number of pieces, unitization, and urban congestion, are the major factors impacting the costs of LTL shipments weighing less than 900 kg.

CONCLUSIONS

Four major conclusions can be drawn from the preceding analysis of motor carrier costs. First, different factors affect transportation costs for shipments of different weights. For shipments weighing more than 900 kg, shipment density is the major factor affecting motor carrier costs. In fact, as shipment weight increases, shipment density becomes increasingly more important.

Other factors used in the current classification process that affect motor carrier costs are stowability and the ease or difficulty in loading and unloading shipments. These classification factors were implicitly considered in the cost analysis as the shipment's degree of unitization and the number of pieces comprising the shipment. These factors particularly affect the costs of shipments weighing less than 900 kg. It also should be noted that, because these factors are not explicitly considered in the ICC's motor carrier cost formulas, it is difficult for the current classification system to accurately reflect the costs incurred by motor carriers in providing transportation services to the smaller LTL shipments.

Second, the cost analysis has shown that other factors not included in the present set of classification factors are important in determining motor carrier costs. Three of these factors are (a) traffic-lane load factor, (b) urban congestion, and (c) the strategy the carrier uses to provide pickup and delivery and platform handling services. Traffic-lane load factor is extremely important for the costs charged to the heavier LTL and all TL shipments, two factors that are extremely important for LTL shipments weighing less than 1.1 t (2000 lb).

A third conclusion is that the current classification system requires modification in order to represent the factors that significantly affect the costs incurred by motor carriers in providing transportation services. Only three of the current 15 NMFC classification factors can be considered cost causative. Two of these three factors can only be implicitly considered in any motor carrier cost formula. The third factor—shipment density—pertains to less than one-third of all shipments, although it is explicitly considered in both the current ICC motor carrier cost formulas and the NMFC as a major determinant of motor carrier costs.

Finally, the New England Coordinated Classification does not reflect the costs incurred by motor carriers in providing transportation services to shipments that require large amounts of terminal services (LTL shipments). The Coordinated Classification can reflect the costs incurred in moving TL shipments if the individual rate basis reflects traffic-lane load factors.

In summary, if a current objective of national transportation policy is to make motor carrier freight rates more cost related, the current classification systems—both the NMFC and the New England Coordinated Classification—must be revised to explicitly include shipment characteristics that have a significant impact on motor carrier costs. Revising the classification system in this manner can also encourage the development of innovative practices in the pricing of motor carrier transportation services.

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Observations of Unregulated Transport Service in Honduras

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This paper presents statistical and substantive observations of the growth of freight service in a developing country that has no significant government regulation. These observations are then used to make some comparisons with U.S. regulatory policy. From November 1975 to May 1978, the authors served as advisers to the Director General of Transport of the government of Honduras. The data and observations used in the paper are derived from various surveys covering a broad spectrum of transport operators throughout Honduras. Where statistics are unavailable, the discussion is based on the authors' personal observations. In Honduras, a highway-oriented economy, transport services are developing through the initiatives of a large number of individual owner-operators, loosely organized cooperatives, and a small number of multivehicle companies. As the paved highway network is being completed, transport service is growing and the level of service is improving with little, if any, government involvement. Market-determined freight rates generally reflect the costs of providing the service and vary reasonably with highway conditions and fluctuating seasonal demands. The unregulated trucking industry has successfully met the rapidly changing needs of the Honduran economy. Although the government maintains broad regulatory powers in reserve, in practice it has minimized political intervention in the economic marketplace. The Hondurans have rejected many U.S.-style regulatory objectives and have instituted nonregulatory measures to meet valid objectives.

Although primarily concerned with the evolution from nonregulation to some regulation in a small country, this paper also comments on how these findings relate to the debate over transport deregulation in the United States. As a backdrop for this discussion, it is useful to summarize regulatory objectives as they have evolved in North America and northern Europe.

The principal regulatory objectives that have evolved in the United States, based primarily on Anglo-Saxon legal concepts, include the following:

1. Equity in the treatment of the public, i.e., the same rates for apparently similar services, and uniform rules (in published tariffs) for carrier-shipper relationships;
2. Maintenance of an "orderly market" in order to avoid the excesses of competition—benefiting the public with stability and quality (or at least uniformity) of services while assuring "honest, efficient and well-managed carriers" a reasonable return on investment and relief from "cutthroat" competition.
3. Providing assured service at fixed rates for all members of the shipping and traveling public, no matter where they are located or how infrequently they use the service, through development of a doctrine of common carrier responsibility defined and enforced by the government; and
4. Closely related to the equity issue, the protection of users (the public) from paying excessive profits to monopolists or semimonopolists.

Other countries outside the North American and northern European areas have developed indigenous (as differentiated from imported) regulations with three objectives:

1. Obtain greater stability in provision and pricing of services (no apparent cases outside Europe and ex-British colonies);
2. Protect state railways from highway competition (also an objective in the United Kingdom at one period and still so in former dependencies); and
3. Allocate entrepreneurial highway transport operations to selected classes or ethnic groups (ethnic Malays in Malaysia, army officers in Spain).

A key difference in most of these other countries, even those giving great weight to stability in pricing and providing services, has been the little emphasis placed on regulation attempting to specify precise rates, routes, and commodities.

During the debate over the pros and cons of deregulating the truck and railroad industries in the United States, one of the major drawbacks has been the lack of data and real-world examples that might lend credence to the theoretical projections of what would occur under different deregulatory schemes. Indeed, it is difficult to find a country that has not practiced some form of government intervention in the economics