# EFFECTS OF MOTOR CARRIER DEREGULATION ON SMALL RURAL COMMUNITIES

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John Ozment

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Mack-Blackwell Transportation Center
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Results of the study also suggest that a serious problem exists in logistics organizations. Few shippers use transit time and/or transit time reliability data to select carriers and/or manage inventory levels. In this age of global competition, shippers should be looking for every advantage they can find, and a total cost approach to managing logistics operations may offer important gains in efficiency.

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John Ozment
Oren Harris Chair of Transportation
Walton College of Business

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## ABSTRACT

Prior to deregulation of the motor carrier industry in 1980, some people feared that service to small communities would suffer from inadequate or disproportionately high cost of transportation. This report assesses the effects of motor carrier deregulation on small, rural communities and shippers in those areas. Previous studies did not find that small communities had been disadvantaged because of motor carrier deregulation, but those studies were conducted shortly after deregulation was implemented, and views may have changed over a longer time period. However, this study found results similar to those of earlier studies in that rural shippers do not seem to have a disadvantage relative to urban shippers with respect to firm performance. However, neither urban nor rural respondents tend to believe that their rates are much better now than before deregulation, and there seems to be consistent agreement that motor carrier service has not improved dramatically.

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# Effects of Motor Carrier Deregulation on Small Rural Communities

## INTRODUCTION

The 1980 Motor Carrier Act brought about major changes in the regulation of the U.S. trucking industry. One of the most significant impacts was in the area of entry and control. Prior to deregulation the Interstate Commerce Commission (ICC) policy frequently required carriers to go miles out of their way to serve small communities or areas that otherwise were not considered attractive from an economic perspective. Rural community markets have certain characteristics that make them more costly to serve than urban areas. For example, the low density of traffic and imbalance between inbound and outbound traffic tend to increase the costs of providing service. Some people feared that by relaxing entry and exit requirements, small communities would suffer from disproportionately high transportation cost, or inadequate service, or both. Supporters of motor carrier deregulation argued that the larger, more attractive markets could support only so many carriers, and following a period of adjustment, many competitors would focus on niche marketing strategies that would take them back to the smaller, out-of-the-way communities. The purpose of this report is to assess whether motor carrier deregulation left small communities and shippers in those areas disadvantaged with respect to the cost and availability of motor carrier service, or whether carrier services are adequate to meet the needs of shippers in rural areas.

Previous studies on the impact of deregulation found little or no adverse impact on rural communities. In fact some studies support a slightly positive effect of deregulation, but there have been some concerns regarding both the loss of service and rates. However, most of the studies were completed within a few years after deregulation, and it is important to examine

issues such as this over a longer time period. For example, the initial response to the deregulation of airlines in 1978 was perceived to be very positive. The entry of several new carriers into the market created a highly competitive environment with lower fares and more frequent service; however, by 1986, most of the new carriers had disappeared and the industry was more heavily concentrated than before (Belobaba and Van Acker, 1994; Brenner, 1988; Kahn, 1988; Rakowski and Bejou, 1992). Thus, it is important after a longer time period to re-examine the effects of motor carrier deregulation and its potential for adverse effects on shippers in small, rural communities.

The remainder of the paper is divided into four sections. Next is a review of the literature on the impacts of motor carrier deregulation on small communities. This is followed by the methodology used in this study. Then the results of the study are reported, and, finally, the conclusions to be drawn are reported.

## LITERATURE REVIEW

Numerous studies have been conducted to investigate the effects of deregulating the U.S. motor carrier industry. These include studies of both interstate and intrastate deregulation. These studies are reviewed below.

### Interstate Deregulation

U.S. Senate (1978)

In 1978 the U.S. Congress commissioned a study to assess the effects of deregulation on rural communities with populations between 1,000 and 25,000 (Committee on Commerce, Science, and Transportation, 1978). This study examined the role of transportation in rural

communities and the make up of those communities in terms of retailers, wholesalers and manufacturers. A sample of 205 small communities was chosen such that the number selected from each grouping of communities was proportional to the number for the broad universe of small communities within the size/geographical grouping. A smaller list of 40 communities was chosen from the larger sample for field interviews. By means of both a mailed questionnaire and personal interviews, data was obtained concerning shipper characteristics, shipment characteristics, service evaluation, rate/service preferences, and alternatives to common carriage. As the community size increased in population from 1,000 to 2,500, 2,500 to 5,000, 5,000 to 10,000, and 10,000 to 25,000, the percentage in retailing declined from 73.2 percent to 53.3 percent, 36.6 percent, and 39.7 percent, respectively. Correspondingly, the percentage of respondents in manufacturing increased from 12.2 percent to 27.1 percent, 39.9 percent, and 40.4 percent, respectively. Thus, in general smaller rural communities were found to rely more on retailing while larger rural communities (over 10,000 population) tended to rely more on manufacturing. This is significant in that manufacturers tend to have more outbound freight than retailers, who tend to have more inbound freight. The volume of inbound traffic was found to exceed the volume of outbound traffic for small communities of all sizes. Roughly, 60 percent of all shipments to and from small communities was found to be less-than truckload (LTL). The other types of businesses (wholesaling, agriculture, mining, and construction) also were found to vary in terms of importance but collectively these industries never matched either retailing or manufacturing in terms of importance.

The study found that shippers in smaller communities were more strongly inclined to prefer lower rates to better service, although a substantial portion indicated a willingness to pay higher rates for service improvements. The study also indicated that small communities relied

more heavily on common and private carriage than on contract or exempt carriage. Among small communities, no relation was found between community size and reliance on common carriers for outbound transportation. The study found that shippers in small communities were generally pleased with the level of service. Common carriers also seemed generally pleased and 75 percent of those serving the smaller communities termed traffic to and from such communities as desirable. This percentage increases to 93 percent for the largest small communities. With an increase in community size, the average number of carriers increased.

From the data collected the study argued that following deregulation, even if no new carriers were to enter small markets, most small markets would receive current levels of service at current rates. Carriers serving these communities would be able to take up the slack. Those communities with the least service would be faced with an increase in average rates or lower levels of average service, but by no means would they be threatened with service withdrawal. However, it was considered likely that additional carriers would enter the small community markets. Once entry restrictions were removed, new entrants would be able to serve small markets at will. Small markets are easily served at adequate levels by relatively few competitors. The study noted that insofar as service to small communities is found to be profitable and desirable, it is feasible that entry into small markets with corresponding increased competition and lower rates might occur under total deregulation. Thus, the report concluded that service to small communities would not deteriorate and might, in fact, improve under deregulation.

Breen and Allen (1979)

Another study confirmed the findings of the congressional study. In that study Breen and Allen (1979) investigated the behavior of 15 major regular route common carriers operating in

the Inland Northwest Region and concluded that the common carrier system was not important to the viability of small communities in rural areas for at least two reasons. First, common carriers in the regulated environment were able to avoid serving small towns in isolated areas if they considered such traffic to be unprofitable, although common carriers have little discretion in terms of the quantity and quality of service offered. Second, the communities were being served by other types of interstate carriers (short haul interstate carriers, UPS, bus operators, private trucking and other small shipment specialists) and, when all of those carriers were considered, the overall level of service was found to be inadequate to meet the needs of the communities, even in communities which the larger carriers preferred to avoid (Breen and Allen 1979).

The evidence gathered in the study indicated that enforcement of the legal service requirements was neither capable of nor necessary for ensuring adequate trucking service to small communities. They also indicated that smaller rural communities had more inbound than outbound freight. This was due to the nature of the smaller rural communities (as noted in the Congressional study described above), consisting of more retail establishments than either manufacturers or wholesalers.

The ICC (1982)

The Interstate Commerce Commission undertook a study under Section 28 of the Motor Carrier Act of 1980, and a profile of shippers in rural communities ranging in population from 100 to 15,000 was created (ICC 1982). In that study, the ICC found characteristics in rural communities similar to those reported in the Congressional study (1978) and that of Breen and Allen (1979). The study found that cities with populations of less than 5,000 had more inbound freight than outbound freight. Cities with populations of 5,000 to 15,000 had more outbound

freight than inbound, again due to the larger number of manufacturers in these larger rural communities. The study found a substantial range of traffic among the shippers extending from less than 1 shipment per month to over 1,200 shipments per week. About 80 percent of the respondents received between 1 and 10 shipments per week and the same percentage sent between 1 and 10 shipments per week. The range in shipment size among the shippers was also large with the most frequent shipment size being less than 500 pounds. The ICC study found that a very small percentage of rural community shippers/receivers relied solely on private carriage (about 1 percent). More than 23 percent relied solely upon for-hire motor carriage.

The report also considered the impact of deregulation on service and rates. In terms of service availability, the study found that service availability changed very little over the three phases of the shipper survey (January 1981, July 1981, and January 1982). Shippers reporting service availability improvement ranged from four to eight times higher than those reporting poorer service availability. With respect to on-time performance and loss and damage, the study concluded that the record was fairly consistent in all three phases. The study also indicated that rates to and from small communities increased less rapidly in the period of regulatory reform than rates to or from large cities.

Motor Carrier Ratemaking Study Commission (1983)

A study conducted by the Motor Carrier Ratemaking Study Commission (1983) indicated that large interstate carriers provided their share of rural community service. The data supported the position that the types of carriers that serve small, rural communities do not appear to be significantly different from those that serve large, urban communities. This is in contrast with Breen and Allen (1979) who found that most of the direct service to rural communities was

provided by the smaller interstate carriers. The study also indicated that traffic carried by regulated carriers had a slightly higher probability of moving under class rates and a slightly higher probability of being in a higher rating if it originates in a sparsely populated region. The study revealed that 40 percent of small community businesses receive freight from a single source origin and 60 percent receive freight from less than ten origins. Most (80%) of the traffic originating in rural communities was found to be destined for counties in metropolitan areas.

The Kidder Studies

A group of studies conducted by Alice E. Kidder are the most thorough due to their longitudinal nature. Kidder studied firms in three southern states (North Carolina, South Carolina and Georgia) and three northern states (Maine, New York, and Pennsylvania). She utilized interviews that spanned seven years, from 1978 through 1985. Kidder's findings were consistent with the aforementioned findings. She conducted 474 interviews in her second study and confirmed the differences between inbound and outbound freight (Kidder 1982). All 474 firms had inbound freight but only 226 had outbound freight. Of the respondents requiring inbound freight, more than 50 percent needed LTL services, 27 percent required small package service, and 14 percent utilize truckload (TL) service. On the outbound side, 44 percent primarily utilized small package freight, 35 percent LTL, and 22 percent required truckload service. Kidder also found that there was more use of private carriage in outbound shipments than inbound shipments, with manufacturers utilizing more common carriage than other industries. This is in agreement with Breen and Allen (1979) and the U.S. Congress Report (1978). Kidder observed that shippers tended to use predominantly one mode for all their freight; more than 60 percent of the shippers indicated that all of their outbound traffic moved by

only one type of carrier. She also found that there was less reliance on common carriage by firms in small communities for inbound shipments.

In her third study, only 4 percent of the respondents reported a decline in quality of service (Kidder 1984). Freight rates increased although many respondents did not know if the increase was greater than the increase in the cost of living. Kidder noted that these findings suggest that the carriers are adjusting the charges for freight service to less-accessible areas.

A fourth follow-up study was conducted by Kidder based on interviews obtained from 204 firms (Kidder 1985). Her basic finding in the fourth study was that the quality and quantity of motor carrier service had not diminished with deregulation for the vast majority of shippers and receivers in rural areas. In fact, the number of competing carriers had increased since the inception of the Motor Carrier Act as was speculated by the U.S. Congress Report (1978). Only 8 percent of the rural firms located within 25 miles of an interstate and less than 12 percent of the firms located farther away saw a decline in carrier service to their community. One percent of the accessible firms, and less than 3 percent of the inaccessible firms reported freight rate increases above 20 percent. These reported problems are slight, by comparison with the reported service gains, increased or stable competition and modest rate hikes which were experienced by the majority of the rural areas. More than 25 percent of the inaccessible areas said that there were more certified carriers serving their community than a year ago. Eleven percent of the accessible areas and 4 percent of the inaccessible areas reported that freight rates had declined for them in the last year. A higher percentage of respondents reported an increase in the frequency of service, carrier availability, and competitiveness than reported decreases in these areas. The majority did not notice a change. For most shippers, very little had changed since the first study in 1978-79: a heavy dependence upon United Parcel Service for small package

shipments, considerable use of private carriage, and generally acceptable levels of freight from an array of certificated carriers.

Iowa Department of Transportation (1986)

Another study was undertaken by the Iowa Department of Transportation (1986). Their survey of motor carrier users indicated that regulated common carrier was the most highly used type of motor carrier and that LTL was the most typical shipment size. This study also reported the lack of any adverse effects on rural shippers within Iowa. Over 40 percent reported that service had improved, 10 percent noted a decrease in the level of service, 22 percent said that there was no change, and 28 percent did not respond. Eleven percent of the respondents noted increases in rates, 18 percent noted a decrease in rates, and 71 percent did not respond to the rate change question. There was no correlation between a decrease in service/higher rates and the size of the community. There was a correlation, however, between the size of the firm and service/rates.

**Intrastate Deregulation**

Studies were also conducted in Florida and Arizona subsequent to the removal of all economic regulation of intrastate motor carriage (Beilock and Freeman 1984). In Florida they surveyed shippers/receivers in urban and non urban areas in June 1981 and June 1982, one and two years respectively after total economic deregulation of intrastate trucking. The sample in both years consisted of 144 shippers/receivers. In Arizona they conducted surveys at three different times: June 1982, November 1982, and July 1983. These surveys represented a pre and two post deregulation time period observations. The sample size ranged from 90 to 127 in the

three surveys. They concluded that shippers preferred deregulation to regulation by a wide margin. In Arizona 73 percent of the rural shippers support deregulation, as compared to 72 percent of the urban ones. The results are similar in Florida. Urban shippers are offered a few more deals in Florida, but almost all other measures of deregulation's effects show no urban-rural difference.

Eight percent in each group had access to fewer service options, while urban shippers actually faced more cutbacks in service (18 percent versus 14 percent). Overwhelming numbers of each group reported overall service improvements, and fewer than 10 percent believe that rates are higher than would have been the case without deregulation. Most shippers felt that deregulation had a moderation influence on the rates they paid and that they had access to more service options after deregulation. No shipper responding to the survey was left without truck service. Some carriers have withdrawn the service they formerly provided, but even greater numbers of carriers are filling the gaps the withdrawals left. Private carriers in Florida were enthusiastic about the benefits of deregulation whereas for-hire carriers were less enthusiastic about deregulation, most felt that the level of competition they faced had increased. However a majority of Arizona carriers and about one-third of the Florida carriers supported deregulation. These studies also found that service had improved (or was not harmed) in the areas of quality of service and rate options following deregulation.

Borlaug encountered similar findings in the states of Oregon and Nevada (Borlaug 1981). She found that shippers and receivers were satisfied with their service and that service had not deteriorated since the passage of the Motor Carrier Act of 1980. Harper (1982) investigated the same question in Minnesota and found that shippers perceived regulatory reform in a positive light, although some additional rate discrimination in favor of large community shippers were

detected (Harper 1982). A study in the state of Washington (1982) also found similar results, in that various service characteristics seemed to remain stable since the passage of the Motor Carrier Act. No significant changes in loss and damage time settlements, transit times, or the number of carriers used were found between the pre-act and the post-act period. Similar perceptions of state deregulation were found in a Wisconsin study (1983). The large majority of shippers (96 percent) reported that trucking service performance since deregulation was as good as or better than before deregulation. Only about 2 percent reported that availability of carriers had deteriorated since deregulation. 96 percent indicated that claims were settled to their satisfaction at least as often since state deregulation in 1982, as before. 67 percent of the shippers said that they were satisfied with deregulation while 27 percent had no opinion. Only 6 percent were dissatisfied.

Pustay (1985) conducted studies on the availability of service to 50 communities with populations of less than 2,000 in each of the four states of Florida, Texas, Ohio and South Dakota. He did not utilize survey techniques as did previous studies. He studied the nature of state regulation, which ranged from no regulation (i.e., Florida) to very restrictive regulation (i.e., Texas) and the quality and quantity of trucking service provided to rural communities in each state. South Dakota had undergone substantial reforms in 1981, particularly in the area of entry decontrol, while Ohio, though not as deregulated to the degree of South Dakota, was not as restrictive as Texas in its intrastate trucking regulations. Pustay determined the level of service of these small rural communities had by examining the number of carriers available to these towns on 1976 and again in 1982. These two time periods represent pre and post Motor Carrier Act data. His finding was that service had indeed improved to these rural towns since the passage of the MCA. In addition, he found that deregulation in Florida had led to major

improvements in intrastate trucking service to small communities. In contrast, little change in intrastate small community service resulted from reforms passed in South Dakota.

**Conclusions**

Prior to the passage of the Motor Carrier Act of 1980, Congress was very concerned about the impact of trucking regulatory reform on service to small communities. Motor carrier service could be maintained either by more vigorous enforcement of the common carrier obligation or through more competition in the trucking industry. The Motor Carrier Act of 1980 together with ICC's actions clearly indicate that the move toward more competition was the strategy adopted. The ICC weakened the common carrier obligation and increased the level of competition by an easy entry policy. The majority of studies of the impacts of trucking deregulation on the quantity, quality, and cost of regulated trucking service to rural communities have found the impacts to be neutral or positive.

For the most part, prior studies of the impact of motor carrier deregulation have shown that trucking services to rural communities did not deteriorate and in many cases improved. The easing of the entry restrictions increased the number of carriers available to serve all areas, and the net effect was reported to be more favorable rates and an increase in available shipping alternatives.

The major question remaining at this point is whether these initial reactions to motor carrier deregulation remains valid or if changes over time have brought about problems for shippers in small, rural communities. Given the potential parallel between the long-term effects of motor carrier deregulation and deregulation of the airline industry, it is desirable to continue to review the effects of motor carrier deregulation. The years immediately following airline

deregulation saw the entry of several new carriers into the market; however, by 1986, most of the new carriers had disappeared and the industry was more heavily concentrated than before. Thus, it is important to re-examine the effects of motor carrier deregulation and its potential for adverse impact on shippers in small, rural communities. The next section presents the methodology used to assess these effects.

## METHODOLOGY

Previous studies on the impact of deregulation found little or no impact on rural communities. In fact some studies support a slight positive effect of deregulation. However, some concerns have been expressed that small communities could be disadvantaged with respect to the level of motor carrier service available as well as actual rates. Moreover, most of the studies were completed within a few years after deregulation.

Based on prior research, concerns have been expressed that small communities could be disadvantaged with respect to the level of motor carrier service available as well as actual rates. Additionally, if deregulation has led to adverse impacts, the economic conditions of communities and respondents from smaller communities should reveal those impacts in terms of relatively lower growth rates of employees, revenues and profits. Furthermore, the general economic conditions in small communities and the general attitudes of shippers locate there should reveal whether deregulation has led to adverse economic impact.

To determine whether adverse conditions have developed in small communities, a sample of manufacturers, wholesalers and retailers, chosen at random from Arkansas, Oklahoma, and Missouri were surveyed. Questionnaires were mailed to 600 businesses (200 each to manufacturers, wholesalers, and retailers) in each state for a total sample size of 1800. Statistical

analyses of the data were performed using Microsoft Excel@ and SPSS@ and the results are presented below.

## RESULTS

Of the 1800 surveys mailed, 104 could not be delivered and were returned unopened. A total of 320 questionnaires were returned, but only 277 were sufficiently complete to be used. This represents an effective response rate of 16.3 percent. Responses were separated into two groups (early and late responders) in order to assess response bias. There were no significant differences between the two groups of respondents with respect to state, community size, or size of firm as measured in revenue. Therefore, response bias was not considered to be a problem in this study.

This section is divided into three parts. Presented first is an overview of the demographics, or respondent characteristics. Next are the results of statistical tests to determine whether significant differences exist between small and large communities. Finally, there is a discussion of the effects of deregulation on model choice and carrier selection decisions.

### Demographics

Table 1 shows the respondents by type of business and state. The respondents were fairly evenly distributed from among the states and by type of business. Of the 277 respondents, 112 (40%) were from Arkansas, 96 (35.%) were from Missouri, and 69 (25%) were from Oklahoma. Wholesalers represented the smallest number of respondents. Only 26 percent were wholesalers while nearly 40% were manufacturers. Retailers represented approximately 34 percent of the sample.

**Table 1**
**Respondent Characteristics: Number of Respondents by State and Type of Business**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| State | No | % | No | % | No | % | No | % |
| Arkansas | 48 | 17.3 | 20 | 7.2 | 44 | 15.9 | 112 | 40.4 |
| Missouri | 31 | 11.2 | 23 | 8.3 | 42 | 15.2 | 96 | 34.7 |
| Oklahoma | 16 | 5.8 | 28 | 10.1 | 25 | 9.0 | 69 | 24.9 |
| Total | 95 | 34.3 | 71 | 25.6 | 111 | 40.1 | 277 | 100.0 |

To assess the impact of deregulation on small communities, a definition of rural communities was necessary. For the purposes of this study, small communities were deemed to be those with populations of less than 50,000, and urban areas were considered to be those communities with populations of 50,000 and over. Table 2 shows the respondents by population and state. Approximately half of the respondents (137 or 49.5%) were from communities with populations of at least 50,000. These were spread fairly even across the three states, and while Oklahoma had the smallest percentage of respondents from larger communities, it was still well represented. About 11 percent of the sample was from communities with populations of less than 5,000, and Oklahoma had the smallest percentage of respondents from the very smallest communities.

**Table 2**
**Respondent Characteristics: Number of Respondents by Population and State**

| | Arkansas | | Missouri | | Oklahoma | | Total | |
|---|---|---|---|---|---|---|---|---|
| Population | No | % | No | % | No | % | No | % |
| Less than 5,000 | 10 | 3.6 | 14 | 5.1 | 7 | 2.5 | 31 | 11.2 |
| 5,000<15,000 | 17 | 6.1 | 14 | 5.1 | 4 | 1.4 | 35 | 12.6 |
| 15,000<25,000 | 19 | 6.9 | 14 | 5.1 | 11 | 4.0 | 44 | 15.9 |
| 25,000<50,000 | 12 | 4.3 | 7 | 2.5 | 11 | 4.0 | 30 | 10.8 |
| 50,000 and over | 54 | 19.5 | 47 | 17.0 | 36 | 13.0 | 137 | 49.5 |
| Total | 112 | 34.7 | 96 | 34.7 | 69 | 24.9 | 277 | 100.0 |

Table 3 shows the respondents by population and type of business. As noted earlier, about half of the respondents were from communities with populations of at least 50,000. The types of business were somewhat evenly distributed across community size, at least with respect to large communities. Most of the respondents from the very small communities were manufacturers, with 48 (17.4%) residing in communities with populations of less than 25,000. Wholesalers represented the smallest number of respondents from small communities. Only 24 wholesalers (8.6%) were from communities with populations of less than 25,000. However, all groups were reasonably well represented.

**Table 3**
**Respondent Characteristics: Number of Respondents by Population and Type of Business**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Population | No | % | No | % | No | % | No | % |
| Less than 5,000 | 8 | 2.9 | 4 | 1.4 | 19 | 6.9 | 31 | 11.2 |
| 5,000<15,000 | 13 | 4.7 | 8 | 2.9 | 14 | 5.1 | 35 | 12.6 |
| 15,000<25,000 | 17 | 6.1 | 12 | 4.3 | 15 | 5.4 | 44 | 15.9 |
| 25,000<50,000 | 11 | 4.0 | 12 | 4.3 | 7 | 2.5 | 30 | 10.8 |
| 50,000 and over | 46 | 16.6 | 35 | 12.6 | 56 | 20.2 | 137 | 49.5 |
| Total | 95 | 34.3 | 72 | 25.6 | 110 | 40.1 | 277 | 100.0 |

Table 4 shows for each state the average size of firm as measured by revenue. Shown in Table 5 is a breakdown of revenue by community size and type of business. The largest respondents, based on average revenue, were from Missouri and were wholesalers. The smallest respondents, based on average revenue, were retailers, also from Missouri, although wholesalers from Oklahoma were also quite small on average. Overall, the respondents from Oklahoma were significantly smaller than those from either Arkansas or Missouri.

It should be noted that the range of respondents' size was quite large. The averages in the tables do not reveal the actual size of the largest and smallest respondents. The largest respondent overall was a manufacturer from a Missouri community with a population in excess of 50,000 and reported revenues of approximately 375 million dollars. The largest wholesaler responding was also from Missouri and reported revenues of approximately 275 million dollars; however, this respondent was from a small community with a population of 5,000 to 15,000 people. The largest retailer was from Arkansas and reported revenues of approximately 180 million dollars. This firm was from a community with a population between 5,000 and 15,000. The smallest manufacturer was from a community in Oklahoma with a population of 50,000 or more and reported revenues of approximately 65,000 dollars. The smallest wholesaler responding was from a community in Missouri with a population of 50,000 or more and reported revenues of approximately 50,000 dollars. The smallest retailer was also from a community in Missouri with a population of 50,000 or more and reported revenues of approximately 20,000 dollars.

The sample was also skewed considerably by a relatively small number of very large respondents. For example, less than 2 percent of the respondents reported revenues of more than 100 million dollars. About 10 percent reported revenues of more than 10 million but less than 100million. Nearly half (48.4%) reported revenues of more than 1 million but less than 10 million dollars. About one-third (32.5%) reported revenues of more than 100 thousand do9llars but less than 1 million dollars, and 7.2 percent reported revenues of 100 thousand dollars or less. Thus, the vast majority of respondents are pretty small with nearly 90 percent earning revenues of less than 10 million dollars, and over 40 percent earning 1 million dollars or less annually.

On average, however, the largest retailers were from small communities. The average size of respondents from large communities with populations of at least 50,000 was only about 5 million dollars whereas the average size of retailers from the very smallest communities was over 15 million dollars. The largest wholesalers were also from small communities, but manufacturers were more evenly spread across all community sizes.

**Table 4**
**Respondent Characteristics: Revenue by State and Type of Business**

| State | Retailers | Wholesalers | Manufacturers | Average |
|---|---|---|---|---|
| Arkansas | $11,152,083 | $ 5,321,388 | $10,707,841 | $ 9,936,364 |
| Missouri | 1,102,581 | 24,182,609 | 16,922,030 | 13,553,180 |
| Oklahoma | 2,312,500 | 1,941,893 | 4,271,400 | 2,871,855 |
| Total | 6,384,000 | 10,098,602 | 11,609,507 | 9,430,094 |

**Table 5**
**Respondent Characteristics: Revenue by Population and Type of Business**

| Population | Retailers | Wholesalers | Manufacturers | Average |
|---|---|---|---|---|
| Less than 5,000 | 15,725,000 | 887,500 | 5,985,526 | 7,841,129 |
| 5,000<15,000 | 15,053,846 | 35,851,250 | 13,251,429 | 19,086,571 |
| 15,000<25,000 | 2,520,588 | 4,091,917 | 11,318,333 | 5,948,364 |
| 25,000<50,000 | 2,140,909 | 2,246,667 | 1,481,429 | 2,029,333 |
| 50,000 and over | 4,751,739 | 10,016,507 | 14,451,166 | 10,061,482 |
| Total | 6,384,000 | 10,098,602 | 11,609,507 | 9,430,094 |

Table 6 shows the number of employees by type of business. There is obviously representative of smaller firms, with a strong correlation between the number of employees and size of firm as measured in revenue. Over two-thirds of the firms reported fewer than 25 employees, and only about 6 percent of the total sample reported having over 100 employees.

**Table 6**
**Respondent Characteristics: Number of Employees by Type of Business**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Employees | No | % | No | % | No | % | No | % |
| Less than 25 | 77 | 27.8 | 61 | 22.0 | 52 | 18.8 | 190 | 68.6 |
| 25<50 | 15 | 5.4 | 4 | 1.4 | 31 | 11.2 | 50 | 18.1 |
| 50<100 | 0 | 0.0 | 4 | 1.4 | 16 | 5.8 | 20 | 7.2 |
| 100<500 | 0 | 0.0 | 0 | 0.0 | 11 | 4.0 | 11 | 4.0 |
| 500 and over | 3 | 1.1 | 2 | 0.7 | 1 | 0.4 | 6 | 2.2 |
| Total | 95 | 34.3 | 71 | 25.6 | 111 | 39.7 | 277 | 100.0 |

Table 7 shows respondent characteristics by type of business and title. Of the 277 respondents, more than 70% held positions at the executive level. The majority (57.4%) identified themselves as the owner, president, or CEO of the firm. Another 15% were vice presidents, and 26% were managers. Only 1.4% of the respondents had titles representing employees other than executive or manager level. Respondents reported an average of 17 years of industry experience, with an average of 11 years with their present firm. More than one-third had 20 or more years of experience, and over 80 percent had 10 or more years of experience. These results suggest that the responses provided were accurate, and this is especially important given that the respondents had to provide information not just about their firms' current operations, but also much from a historical perspective.

**Table 7**
**Respondent Characteristics: Type of Business by Respondent Title**

| | Pres/CEO | | Vice Pres | | Manager | | Other | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | No | % | No | % |
| Retail | 54 | 19.5 | 8 | 2.9 | 29 | 10.5 | 4 | 1.4 | 95 | 34.3 |
| Wholesale | 56 | 20.2 | 4 | 1.4 | 11 | 4.0 | 0 | 0.0 | 71 | 25.6 |
| Mfg | 49 | 17.7 | 30 | 10.8 | 32 | 11.6 | 0 | 0.0 | 111 | 40.1 |
| Total | 159 | 57.4 | 42 | 15.2 | 72 | 26.0 | 4 | 1.4 | 277 | 100.0 |

Another characteristic that was important to this study was the number of years the business had been in the community. Since respondents were asked to report information relating to their company's financial and operating characteristics at the time of the survey and prior to deregulation, it was important to determine how long the business had been operating in the community. Thus, they were asked to report how long the firm had been operating in that community. The responses were coded into four categories: less than 5 years, 5 to 10 years, 10 to 15 years, and over 15 years. Table 8 shows the number and percentage of firms by type of business and how long they have been operating in the community. Over half of the firms had been in the community for more than 15 years. Thus, most were operating prior to the deregulation of motor carriers in 1980. Only about 25 percent of the respondents were with firms that had not been in the community for more than 10 years. If the firm had not been operating in the community prior to deregulation, respondents were asked to report data and operating procedures for as early a time period as possible so that the number of years the firm had been in the community could be used to adjust data to an annual basis.

**Table 8**
**Respondent Characteristics: Number of Years the Business Has Been in the Community**

| Years in the | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Community | No | % | No | % | No | % | No | % |
| Less than 5 | 7 | 2.5 | 3 | 1.1 | 10 | 3.6 | 20 | 7.2 |
| 5 to 10 | 12 | 4.3 | 27 | 9.7 | 15 | 5.4 | 54 | 19.5 |
| 10 to 15 | 19 | 6.9 | 10 | 3.6 | 20 | 7.2 | 49 | 17.7 |
| Over 15 | 57 | 20.6 | 31 | 11.2 | 66 | 23.8 | 154 | 55.6 |
| Total | 95 | 34.3 | 71 | 25.6 | 111 | 40.1 | 277 | 100.0 |

Tables 9 and 10 show the percentage of inbound traffic by state, community size and type of business. As has been noted in previous research, retailers have more inbound freight than

either wholesalers or manufacturers. However, previous research noted the imbalance of more inbound traffic in small communities, but in this study there is very little difference in the percentage of inbound traffic in small communities and that of large communities. Approximately 90 percent of all retailers' freight is inbound, but the distribution of retailers in large communities and the distribution of wholesalers and manufacturers in small communities seems to have led to a reasonable balance across all communities. It is interesting to note that over 60 percent of freight is inbound, irrespective of community size. This is undoubtedly a reflection of a growing service economy. It may also be reflective of the increasing ability of small communities to attract manufacturers and other businesses due the quality of life in small towns. This is consistent with findings in the latest census which has shown an influx of young families to smaller communities (Smith 2001).

**Table 9**
**Respondent Characteristics: Percentage of Inbound Traffic by State and Type of Business**

| State | Retailers | Wholesalers | Manufacturers | Average |
|---|---|---|---|---|
| Arkansas | 92.8 | 48.2 | 50.8 | 68.3 |
| Missouri | 91.7 | 47.7 | 50.5 | 63.1 |
| Oklahoma | 92.3 | 48.7 | 48.7 | 58.8 |
| Total | 92.3 | 48.2 | 50.2 | 64.1 |

**Table 10**
**Respondent Characteristics: Percentage of Inbound Traffic by Community Size and Type of Business**

| Population | Retailers | Wholesalers | Manufacturers | Total |
|---|---|---|---|---|
| Less than 5,000 | 91.8 | 47.5 | 50.2 | 60.6 |
| 5,000<15,000 | 91.5 | 49.6 | 51.9 | 66.1 |
| 15,000<25,000 | 92.5 | 46.8 | 50.5 | 65.7 |
| 25,000<50,000 | 92.4 | 47.8 | 48.4 | 64.3 |
| 50,000 and over | 92.6 | 48.6 | 50.0 | 63.9 |
| Total | 92.3 | 48.2 | 50.2 | 64.1 |

**Tests of the Impact of Deregulation**

If deregulation has led to adverse impacts in small communities, it should be revealed in the economic conditions in terms of relatively lower growth rates of the firms locate there. In this study, firms were asked to report their growth in terms of employees, revenue, and profits. Prior research has revealed concerns that small communities could be disadvantaged with respect to the level of motor carrier service available as well as actual rates. Thus, respondents were asked to report the changes in motor carrier rates and services. Furthermore, the general economic conditions in small communities and the general attitudes of shippers locate there should reveal whether deregulation has led to adverse economic impact, so respondents were asked about their perceptions of how motor carrier deregulation has affected their communities and businesses.

Table 11 shows the change in employment for Retailers, Wholesalers, and Manufacturers by community size. Retailers showed the smallest overall growth and Wholesalers grew the most. However, there does not appear to be much difference in growth relative to community size. Figure 1 shows the results of tests for significant differences in urban and rural respondents with respect to changes in employment for each type of business and for the overall sample. The percentage growth in the number of employees of firms in urban areas was not significantly higher than that of firms in rural areas for any of the business types or for the overall sample. Thus, based on growth in terms of employment, firms in rural areas do not appear to have been disadvantaged relative to those in urban areas in the period following deregulation.

**Table 11**
**Percentage Change in Employment by Community Size and Type of Business**

| Population | Retailers | Wholesalers | Manufacturers | Total |
|---|---|---|---|---|
| Less than 5,000 | 5.0 | 6.5 | 8.1 | 7.1 |
| 5,000<15,000 | 2.7 | 11.0 | 5.9 | 5.9 |
| 15,000<25,000 | 2.6 | 8.8 | 0.7 | 3.6 |
| 25,000<50,000 | 8.0 | 9.1 | 4.3 | 7.6 |
| 50,000 and over | 3.2 | 7.2 | 5.6 | 5.2 |
| Total | 3.7 | 8.2 | 5.3 | 5.5 |

**Figure 1**
**T-tests* of Differences in Urban and Rural Respondents:**
**Percentage Change in Employment**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Statistic | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban |
| Mean | 4.22 | 3.24 | 9.13 | 7.24 | 5.02 | 5.60 | 5.80 | 5.23 |
| Variance | 50.39 | 39.52 | 39.22 | 53.65 | 69.01 | 58.97 | 58.06 | 52.78 |
| Observations | 49.00 | 46.00 | 36.00 | 35.00 | 55.00 | 56.00 | 140.00 | 137.00 |
| Hypothesized Mean Difference | 0.00 | | 0.00 | | 0.00 | | 0.00 | |
| Degrees of Freedom | 93.00 | | 67.00 | | 108.00 | | 275.00 | |
| t Stat | 0.72 | | 1.16 | | -0.38 | | 0.64 | |
| P(T<=t) one-tail | 0.24 | | 0.12 | | 0.35 | | 0.26 | |
| t Critical one-tail | 1.66 | | 1.67 | | 1.66 | | 1.65 | |
| P(T<=t) two-tail | 0.48 | | 0.25 | | 0.70 | | 0.52 | |
| t Critical two-tail | 1.99 | | 2.00 | | 1.98 | | 1.97 | |

*Assumes Unequal Variances

Table 12 shows the change in revenue for Retailers, Wholesalers, and Manufacturers by community size. As with change in employment, retailers showed the smallest overall growth in terms of revenue and Wholesalers grew the most. However, there does not appear to be much difference in growth relative to community size. Figure 2 shows the results of tests for significant differences in urban and rural respondents with respect to changes in revenue for each type of business and for the overall sample. The percentage growth in revenue of firms in urban areas was not significantly higher than that of firms in rural areas for any of the business types or for the overall sample. Thus, based on growth in terms of revenue, firms in rural areas do not appear to have been disadvantaged relative to those in urban areas in the period following deregulation.

**Table 12**
**Percentage Change in Revenue by Community Size and Type of Business**

| Population | Retailers | Wholesalers | Manufacturers | Total |
|---|---|---|---|---|
| Less than 5,000 | 9.6 | 9.8 | 10.4 | 10.1 |
| 5,000<15,000 | 11.2 | 12.4 | 10.8 | 11.3 |
| 15,000<25,000 | 6.0 | 9.2 | 4.2 | 6.3 |
| 25,000<50,000 | 7.6 | 12.5 | 8.2 | 9.7 |
| 50,000 and over | 7.2 | 8.3 | 8.4 | 8.0 |
| Total | 7.8 | 9.7 | 8.5 | 8.5 |

**Figure 2**
**T-tests* of Differences in Urban and Rural Respondents:**
**Percentage Change in Revenue**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Statistic | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban |
| Mean | 8.33 | 7.22 | 11.04 | 8.26 | 8.54 | 8.42 | 9.11 | 7.97 |
| Variance | 62.16 | 19.61 | 157.89 | 33.81 | 132.96 | 85.62 | 114.19 | 49.86 |
| Observations | 49.00 | 46.00 | 36.00 | 35.00 | 55.00 | 56.00 | 140.00 | 137.00 |
| Hypothesized Mean Difference | 0.00 | | 0.00 | | 0.00 | | 0.00 | |
| Degrees of Freedom | 76.00 | | 50.00 | | 103.00 | | 242.00 | |
| t Stat | 0.85 | | 1.20 | | 0.06 | | 1.04 | |
| P(T<=t) one-tail | 0.20 | | 0.12 | | 0.48 | | 0.15 | |
| t Critical one-tail | 1.67 | | 1.68 | | 1.66 | | 1.65 | |
| P(T<=t) two-tail | 0.40 | | 0.23 | | 0.95 | | 0.30 | |
| t Critical two-tail | 1.99 | | 2.01 | | 1.98 | | 1.97 | |

*Assumes Unequal Variances

Table 13 shows the change in profits for Retailers, Wholesalers, and Manufacturers by community size. Manufacturers showed the smallest overall growth in terms of profits and Wholesalers grew the most, just as with employment and revenue. Again, there does not appear to be much difference in growth relative to community size. Figure 3 shows the results of tests for significant differences in urban and rural respondents with respect to changes in profits for each type of business and for the overall sample. The percentage growth in profits of firms in urban areas was not significantly higher than that of firms in rural areas for any of the business types or for the overall sample. Thus, based on growth in terms of profit, firms in rural areas do not appear to have been disadvantaged relative to those in urban areas in the period following deregulation.

**Table 13**
**Percentage Change in Profits by Community Size and Type of Business**

| Population | Retailers | Wholesalers | Manufacturers | Total |
|---|---|---|---|---|
| Less than 5,000 | 6.4 | 8.9 | 6.1 | 6.5 |
| 5,000<15,000 | 7.2 | 9.7 | 4.9 | 6.8 |
| 15,000<25,000 | 8.0 | 11.6 | 5.5 | 8.1 |
| 25,000<50,000 | 5.7 | 10.4 | 5.4 | 7.5 |
| 50,000 and over | 5.6 | 10.4 | 5.7 | 6.8 |
| Total | 6.3 | 10.4 | 5.6 | 7.1 |

**Figure 3**
**T-tests* of Differences in Urban and Rural Respondents:**
**Percentage Change in Profits**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Statistic | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban |
| Mean | 7.02 | 5.60 | 10.47 | 10.37 | 5.54 | 5.67 | 7.33 | 6.85 |
| Variance | 36.34 | 37.46 | 114.63 | 82.62 | 53.31 | 50.62 | 65.99 | 57.82 |
| Observations | 49.00 | 46.00 | 36.00 | 35.00 | 55.00 | 56.00 | 140.00 | 137.00 |
| Hypothesized Mean Difference | 0.00 | | 0.00 | | 0.00 | | 0.00 | |
| Degrees of Freedom | 92.00 | | 68.00 | | 109.00 | | 274.00 | |
| t Stat | 1.14 | | 0.04 | | -0.10 | | 0.51 | |
| P(T<=t) one-tail | 0.13 | | 0.48 | | 0.46 | | 0.31 | |
| t Critical one-tail | 1.66 | | 1.67 | | 1.66 | | 1.65 | |
| P(T<=t) two-tail | 0.26 | | 0.97 | | 0.92 | | 0.61 | |
| t Critical two-tail | 1.99 | | -11.52 | | 1.98 | | 1.97 | |

*Assumes Unequal Variances

In general, firms in rural areas seem to have performed better than those in urban areas with respect to changes in employment, revenue, and profits, but the differences were not significant. Certainly, it cannot be concluded that firms in rural areas have been disadvantaged relative to those in urban areas during the time since motor carriers were deregulated, at least with respect to growth as measured by employment, revenue, and profits.

Respondents were also asked about changes in rates and service levels following deregulation. First they were asked to agree or disagree with respect to whether they believed that rates are better since deregulation. Responses were on a five-point scale where 5 was strongly agree and 1 was strongly disagree; 3.0 is a neutral response. Table 14 shows the mean

responses to this question by community size and type of business. There seems to be some general agreement that rates improved following deregulation, but it is not strong. Wholesalers seem to have benefited more than either retailers or manufacturers, and the smallest communities feel less strongly about improvement, but the differences are not large. Figure 4 shows the results of significance tests for differences in urban and rural respondents with respect to this issue. None of the differences are statistically significant. The closest would be in the case of manufacturers. Manufacturers in rural areas tended to agree more strongly that rates have improved than manufacturers in urban areas, but the difference is only marginally significant at the 0.08 level. However, the variances are quite large given the five-point scale. A further break down of responses revealed that only 37 (26%) of the respondents from rural areas indicated that they either disagreed or strongly disagreed with the statement that rates are better since deregulation. None of the respondents from urban areas strongly disagreed, and only 18 (13%) disagreed.

**Table 14**
**Respondents' Agreement that Rates are Better Since Deregulation: Mean Scores by Community Size and Type of Business***

| Population | Retailers | Wholesalers | Manufacturers | Total |
|---|---|---|---|---|
| Less than 5,000 | 3.1 | 3.8 | 3.7 | 3.6 |
| 5,000<15,000 | 3.8 | 4.0 | 3.8 | 3.8 |
| 15,000<25,000 | 3.6 | 4.6 | 4.0 | 4.0 |
| 25,000<50,000 | 4.2 | 4.1 | 3.0 | 3.9 |
| 50,000 and over | 4.0 | 4.2 | 3.4 | 3.8 |
| Total | 3.8 | 4.2 | 3.5 | 3.8 |

* Based on a 5-point scale, where 5.0 is strongly agree and 1 is strongly disagree.

**Figure 4**
**T-tests* of Differences in Urban and Rural Respondents:**
**Better Rates Since Deregulation**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Statistic | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban |
| Mean | 3.71 | 3.96 | 4.19 | 4.17 | 3.73 | 3.36 | 3.84 | 3.77 |
| Variance | 1.58 | 1.29 | 0.90 | 1.15 | 1.87 | 1.83 | 1.54 | 1.58 |
| Observations | 49.00 | 46.00 | 36.00 | 35.00 | 55.00 | 56.00 | 140.00 | 137.00 |
| Hypothesized Mean Difference | 0.00 | | 0.00 | | 0.00 | | 0.00 | |
| Degrees of Freedom | 93.00 | | 68.00 | | 109.00 | | 275.00 | |
| t Stat | -0.99 | | 0.10 | | 1.43 | | 0.51 | |
| P(T<=t) one-tail | 0.16 | | 0.46 | | 0.08 | | 0.31 | |
| t Critical one-tail | 1.66 | | 1.67 | | 1.66 | | 1.65 | |
| P(T<=t) two-tail | 0.33 | | 0.92 | | 0.15 | | 0.61 | |
| t Critical two-tail | 1.99 | | 5.66 | | 1.98 | | 1.97 | |

*Assumes Unequal Variances

Respondents were also asked to agree or disagree with respect to whether they believed that service is better since deregulation. Table 15 summarizes the responses to this question. The most interesting point is the strong disagreement with the statement by virtually all respondents. Neither group tended to think that service was better. Figure 5 shows the results of tests for significant differences in urban and rural respondents with respect to their perceptions regarding carrier services. There was no significant difference between the responses of the two groups, and the mean was below 3.0, where 3.0 would indicate a neutral view. Only 9 respondents in total from both groups strongly agreed with the statement. This indicates a general concern for the overall level of motor carrier service. It is likely that it has little to do with whether transportation is regulated or not, but rather with an ongoing battle to survive in an increasingly competitive environment.

**Table 15**
**Respondents' Agreement that Service is Better Since Deregulation: Mean Scores by Community Size and Type of Business***

| Population | Retailers | Wholesalers | Manufacturers | Total |
|---|---|---|---|---|
| Less than 5,000 | 2.1 | 2.3 | 2.7 | 2.5 |
| 5,000<15,000 | 2.2 | 2.6 | 2.6 | 2.5 |
| 15,000<25,000 | 2.4 | 2.3 | 2.7 | 2.5 |
| 25,000<50,000 | 2.0 | 2.5 | 2.7 | 2.4 |
| 50,000 and over | 2.5 | 2.3 | 2.6 | 2.5 |
| Total | 2.3 | 2.4 | 2.6 | 2.5 |

* Based on a 5-point scale, where 5.0 is strongly agree and 1 is strongly disagree.

**Figure 5**
**T-tests* of Differences in Urban and Rural Respondents: Better Service Since Deregulation**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Statistic | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban |
| Mean | 2.20 | 2.50 | 2.44 | 2.26 | 2.67 | 2.61 | 2.45 | 2.48 |
| Variance | 1.12 | 1.10 | 0.94 | 0.67 | 0.37 | 0.46 | 0.81 | 0.74 |
| Observations | 49.00 | 46.00 | 36.00 | 35.00 | 55.00 | 56.00 | 140.00 | 137.00 |
| Hypothesized Mean Difference | 0.00 | | 0.00 | | 0.00 | | 0.00 | |
| Degrees of Freedom | 93.00 | | 68.00 | | 108.00 | | 275.00 | |
| t Stat | -1.37 | | 0.88 | | 0.54 | | -0.30 | |
| P(T<=t) one-tail | 0.09 | | 0.19 | | 0.30 | | 0.38 | |
| t Critical one-tail | 1.66 | | 1.67 | | 1.66 | | 1.65 | |
| P(T<=t) two-tail | 0.17 | | 0.38 | | 0.59 | | 0.76 | |
| t Critical two-tail | 1.99 | | 2.00 | | 1.98 | | 1.97 | |

*Assumes Unequal Variances

Respondents were asked to agree or disagree with respect to whether they believed that motor carrier deregulation had made it easier for them to attract new businesses to their communities. Table 16 shows how respondents viewed this question. Generally, respondents felt that deregulation had little to do with their ability to attract new businesses to their communities. Figure 6 shows the results of tests for significant differences in urban and rural responses to this question. Neither group tended to think that the statement was true, and there was not a significant difference in the responses of the two groups. The implication here is that managers apparently feel that regulation of transportation is probably not the key to attracting

new businesses. For example, condition and extent of infrastructure may be more important than whether carriers compete in a regulated or deregulated environment.

**Table 16**
**Respondents' Agreement that it is Easier to Attract New Business Deregulation: Mean Scores by Community Size and Type of Business***

| Population | Retailers | Wholesalers | Manufacturers | Total |
|---|---|---|---|---|
| Less than 5,000 | 2.1 | 2.0 | 2.8 | 2.5 |
| 5,000<15,000 | 2.2 | 2.1 | 2.6 | 2.3 |
| 15,000<25,000 | 2.4 | 2.2 | 2.9 | 2.5 |
| 25,000<50,000 | 1.5 | 2.2 | 2.9 | 2.1 |
| 50,000 and over | 2.5 | 2.0 | 2.6 | 2.4 |
| Total | 2.3 | 2.1 | 2.7 | 2.4 |

* Based on a 5-point scale, where 5.0 is strongly agree and 1 is strongly disagree.

**Figure 6**
**T-tests* of Differences in Urban and Rural Respondents: Better Able to Attract New Businesses**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Statistic | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban |
| Mean | 2.12 | 2.46 | 2.14 | 2.03 | 2.76 | 2.61 | 2.38 | 2.41 |
| Variance | 1.19 | 1.19 | 1.15 | 0.85 | 0.67 | 0.75 | 1.06 | 0.96 |
| Observations | 49.00 | 46.00 | 36.00 | 35.00 | 55.00 | 56.00 | 140.00 | 137.00 |
| Hypothesized Mean Difference | 0.00 | | 0.00 | | 0.00 | | 0.00 | |
| Degrees of Freedom | 93.00 | | 68.00 | | 109.00 | | 275.00 | |
| t Stat | -1.49 | | 0.46 | | 0.98 | | -0.25 | |
| P(T<=t) one-tail | 0.07 | | 0.32 | | 0.16 | | 0.40 | |
| t Critical one-tail | 1.66 | | 1.64 | | 1.66 | | 1.65 | |
| P(T<=t) two-tail | 0.14 | | 0.37 | | 0.33 | | 0.80 | |
| t Critical two-tail | 1.99 | | 2.00 | | 1.98 | | 1.97 | |

*Assumes Unequal Variances

Finally, respondents were asked to agree or disagree with whether they felt that the overall impact of deregulation has been positive. Table 17 provides the responses to this question. Generally, respondents in did not feel strongly that deregulation has had an overall positive impact. The general response was just barely above a neutral score of 3.0; however, wholesalers and manufacturers seemed to support the statement more than retailers. When

combined, the mean score for wholesalers and manufacturers was 3.74 compared to the score of retailers of 2.78. This difference is statistically significant at the 0.000 level.

Figure 7 shows the results of tests for significant differences in urban and rural respondents with respect to their perceptions regarding whether motor carrier deregulation has had an overall positive impact. Retailers in large communities seemed to support the statement more than those in smaller communities, but the difference was not significant. There was very virtually no difference in the responses of wholesalers in small and large communities, but manufacturers in large communities tended more than those in smaller communities to feel that deregulation has had an overall positive impact. The difference was significant at the 0.05 level.

It was surprising to see so little support for an overall positive impact of motor carrier deregulation, especially those in larger communities. Anecdotally, shippers seem to favor deregulation and would not want to return to a highly regulated environment for trucking. While it could be implied from these results that shippers do not feel strongly that deregulation has had a positive impact, it is not clear from the responses that any problems have resulted from deregulation. Respondents may not necessarily feel that they are better off because of deregulation, but this may not mean that they feel they are worse off either. Thus, there may have been a problem with the wording of this question. Upon reflection, it may have been better to ask whether shippers felt that there had been negative results due to deregulation. Since most of the concern has been that small shippers and small communities would suffer due to deregulation, a different phrasing of the question may have provided more meaningful results.

**Table 17**
**Respondents' Agreement as to the Overall Positive Impact of Deregulation: Mean Scores by Community Size and Type of Business***

| Population | Retailers | Wholesalers | Manufacturers | Total |
|---|---|---|---|---|
| Less than 5,000 | 3.1 | 4.0 | 3.8 | 3.7 |
| 5,000<15,000 | 2.4 | 3.5 | 3.6 | 3.1 |
| 15,000<25,000 | 2.7 | 3.6 | 3.4 | 3.2 |
| 25,000<50,000 | 2.8 | 3.8 | 4.0 | 3.5 |
| 50,000 and over | 2.8 | 3.7 | 3.9 | 3.5 |
| Total | 2.8 | 3.7 | 3.8 | 3.4 |

* Based on a 5-point scale, where 5.0 is strongly agree and 1 is strongly disagree.

**Figure 7**
**T-tests* of Differences in Urban and Rural Respondents: Overall Impact of Deregulation**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Statistic | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban |
| Mean | 2.71 | 2.85 | 3.67 | 3.66 | 3.67 | 3.91 | 3.34 | 3.49 |
| Variance | 0.83 | 0.93 | 0.46 | 0.64 | 0.56 | 0.56 | 0.83 | 0.91 |
| Observations | 49.00 | 46.00 | 36.00 | 35.00 | 55.00 | 56.00 | 140.00 | 137.00 |
| Hypothesized Mean Difference | 0.00 | | 0.00 | | 0.00 | | 0.00 | |
| Degrees of Freedom | 93.00 | | 66.00 | | 109.00 | | 274.00 | |
| t Stat | -0.69 | | 0.05 | | -1.68 | | -1.37 | |
| P(T<=t) one-tail | 0.25 | | 0.48 | | 0.05 | | 0.09 | |
| t Critical one-tail | 1.66 | | 1.67 | | 1.66 | | 1.65 | |
| P(T<=t) two-tail | 0.49 | | 0.96 | | 0.10 | | 0.17 | |
| t Critical two-tail | 1.99 | | 2.00 | | 1.98 | | 1.97 | |

*Assumes Unequal Variances

## Effects of Deregulation on Carrier Selection

Another area in which deregulation of the motor carrier industry may have had an impact is on the carrier selection and mode choice decisions of shippers. Downward pressure on rates brought about by increased competition due to relaxed entry requirements should make it more difficult for shippers to justify operating and maintaining private fleets. Additionally, railroads have expressed concern that the destructive competition resulting from relaxed entry requirements would divert traffic from the rails to the highways. There can be little question that truck traffic on our nation's highways has increased, but it is not clear whether it is due to

economic growth or diversion of traffic from rail to highways. Additionally, other modes may have been affected as the competitive environment changed following deregulation.

Thus, respondents were asked several questions relating to their choice of modes and carrier selection practices and how they have changed since 1980 or since the business opened. Specifically, they were asked to report the current percentages of inbound and outbound freight moved by the various modes and what those percentages were prior to deregulation or when the business first opened. The modes for which information was requested were rail (RR), private truck (PVT), for-hire truckload (TL), less than truckload (LTL), intermodal (IM), express (EXP) (i.e., UPS, FedEx, etc.), and other modes (OTHR). Other modes might include shipments sent by airfreight, parcel post, bus, Amtrak, etc.

Table 18 shows the net changes in the percentage of inbound freight movements by type of business and mode. Only 202 respondents provided enough information to analyze changes in modes over time, and some of the respondents' math was somewhat lacking in that the percentages did not always add to 100. However, the errors were not great, and totaled less than 1 percent in aggregate. The last column in Table 18 shows the error determined by summing the percentages across all three types of businesses.

Although many respondents reported either increasing or decreasing the use of one or more modes, the net effect was not great for inbound traffic. As can be seen, most of the net changes were less than 1 percent. That is, where one shipper may have decreased the use of rail in favor of truckload (TL) service, another shipper did just the opposite. The net effect was that large changes across the sample were not evident. There were a few trends, however, that appear to have emerged. The largest changes in mode usage were for manufacturers who appear to have diverted LTL shipments to TL and rail. Wholesalers seem to have done just the opposite,

switching from TL to LTL. Again, however, these changes are not very large given the length of time involved.

**Table 18**
**Changes in Percentages of Inbound Freight Moved by Type of Business and Mode**

| | Railroad | Private | TL | LTL | Intermodal | Exp | Other | Error |
|---|---|---|---|---|---|---|---|---|
| Retailers | 0.00 | -0.76 | -0.39 | 1.36 | 0.00 | -0.51 | 0.31 | 0.00 |
| Wholesalers | 0.00 | 0.57 | -3.45 | 3.66 | 0.34 | -2.93 | 1.72 | -0.09 |
| Manufacturers | 4.93 | -0.02 | 2.03 | -5.82 | 0.00 | 0.23 | -0.50 | 0.85 |
| Total | 2.12 | -0.07 | -0.21 | -1.07 | 0.10 | -0.88 | 0.36 | 0.34 |

Table 19 shows the net changes in the percentage of outbound freight movements by type of business and mode. There was a much more substantial change in modal distribution of outbound shipments. Manufacturers seemed consistent with the substitution of rail TL for LTL, and reduced the use of private trucking. Retailers and wholesalers reduced the use of private trucking and express carriers by significant amounts, substituting TL and LTL instead. The volume of outbound traffic by retailers is so small that the changes reported here are virtually meaningless. For wholesalers, however, the reduction in express services probably reflects the UPS strike in the mid-1990s in which many shippers switched to LTL. The reduction in the use of private trucking most likely reflects a switch to TL as the competitive environment drove rates down below levels where private fleets could be justified as easily as they had been in the past.

**Table 19**
**Changes in Percentages of Outbound Freight Moved by Type of Business and Mode**

| | Railroad | Private | TL | LTL | Intermodal | Exp | Other | Error |
|---|---|---|---|---|---|---|---|---|
| Retailers | 2.43 | -19.41 | 24.90 | 4.20 | 0.66 | -11.98 | -1.11 | -0.33 |
| Wholesalers | 0.00 | -28.22 | 17.85 | 33.56 | 0.36 | -23.56 | 0.00 | 0.00 |
| Manufacturers | 8.24 | -8.36 | 8.87 | -6.50 | -0.28 | -1.59 | -0.13 | 0.26 |
| Total | 4.24 | -17.10 | 16.16 | 7.64 | 0.18 | -10.71 | -0.39 | 0.01 |

The literature has shown that shippers consider overall transit time and transit time reliability to be among the most important criteria used when selecting modes of transportation and specific carriers (McGinnis, 1990; Murphy and Hall, 1995). This is not surprising since inventory carrying costs are affected by both transit time and transit time reliability (Coyle, Bardi, and Novack, 1996; Ballou, 1999). The time-honored method of dealing with undependable carrier service has been to hold additional inventory as safety stock to protect against stockouts in the event of service failures on the part of the carrier (Coyle, Bardi, and Novack, 1996; Ballou, 1999). Thus, transit time and reliability data are an integral part of managing the overall logistics operation in an organization. However, it has been shown that shippers are biased by perceptions and appear to make decisions based on how they feel about a situation rather than relying on actual data and/or analytic methods (Evers, Harper, and Needham, 1996).

Thus, respondents were asked about how they select carriers and modes of transportation. They were asked specifically how important they felt transit time and transit time reliability were to their businesses, whether they measured it, and how if the information was used in carrier selection decisions or for managing inventory. Table 20 shows the mean scores for the importance of transit time for each type of business by community size. There are no significant differences in responses by type of business or community size. Virtually all shippers feel that transit time is very important. However, when asked if they measure transit times of carriers, less than two-thirds of the respondents reported that they did.

**Table 20**
**Importance of Transit Time by Community Size and Type of Business***

| Population | Retailers | Wholesalers | Manufacturers | Total |
|---|---|---|---|---|
| Less than 5,000 | 4.8 | 4.5 | 4.4 | 4.5 |
| 5,000<15,000 | 4.2 | 4.3 | 4.3 | 4.2 |
| 15,000<25,000 | 4.1 | 4.7 | 4.0 | 4.2 |
| 25,000<50,000 | 4.4 | 4.3 | 4.9 | 4.5 |
| 50,000 and over | 4.4 | 4.4 | 4.2 | 4.3 |
| Total | 4.3 | 4.4 | 4.3 | 4.3 |

* Based on a 5-point scale, where 5.0 is very important and 1 is not important at all.

Table 21 shows the number and percentage of respondents who measure transit time. While there were no significant differences in community size, there were significant differences in types of businesses. Manufacturers are much more likely to measure transit time than either retailers or wholesalers, and wholesalers are more likely to measure transit time than retailers. Perhaps more important were the responses to questions regarding the use of transit time to aid in carrier selection decisions and managing inventory levels.

**Table 21**
**Number and Percentage of Respondents Who Measure Transit Time**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Population | No | % | No | % | No | % | No | % |
| Less than 5,000 | 5 | 1.8 | 4 | 1.4 | 12 | 4.3 | 21 | 7.6 |
| 5,000<15,000 | 5 | 1.8 | 6 | 2.2 | 11 | 4.0 | 22 | 7.9 |
| 15,000<25,000 | 5 | 1.8 | 11 | 4.0 | 11 | 4.0 | 27 | 9.7 |
| 25,000<50,000 | 2 | 0.7 | 10 | 3.6 | 5 | 1.8 | 17 | 6.1 |
| 50,000 and over | 25 | 9.0 | 26 | 9.4 | 43 | 15.5 | 94 | 33.9 |
| Total | 42 | 15.2 | 57 | 20.6 | 82 | 29.6 | 181 | 65.3 |

Table 22 shows the number and percentage of respondents who reported using transit time to aid in carrier selection. Only about one-fourth of the respondents reported that they used the data for this purpose, but none reported that they used it in making inventory decisions.

Manufacturers were the most likely to use transit time data in making carrier selection decisions, and retailers were the least likely to use the data. However, there was not a significant difference in whether firms were located in small or large communities. The more important variables seem to be size and growth. Of the 43 manufacturers that reported using transit time for carrier selection purposes, none earned less than ten million dollars annually, and virtually all had increases in profits in excess of 10 percent per year.

**Figure 22**
**Number and Percentage of Respondents Who Use Transit Time in Carrier Selection**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Population | No | % | No | % | No | % | No | % |
| Less than 5,000 | 1 | 0.4 | 0 | 0.0 | 8 | 2.9 | 9 | 3.2 |
| 5,000<15,000 | 2 | 0.7 | 1 | 0.4 | 6 | 2.2 | 9 | 3.2 |
| 15,000<25,000 | 2 | 0.7 | 4 | 1.4 | 6 | 2.2 | 12 | 4.3 |
| 25,000<50,000 | 0 | 0.0 | 1 | 0.4 | 3 | 1.1 | 4 | 1.4 |
| 50,000 and over | 4 | 1.4 | 12 | 4.3 | 20 | 7.2 | 36 | 13.0 |
| Total | 9 | 3.2 | 18 | 6.5 | 43 | 15.5 | 70 | 25.3 |

Tables 23, 24, and 25 summarize similar results regarding transit time reliability. There was virtually no difference in the perceived importance of transit time and transit time reliability, and there was very little difference in the extent to which it was measured. Only about 57 percent of the respondents reported measuring transit time reliability, compared to 65 percent who measured transit time. Only about 13 percent used the data to aid in carrier selection decisions which is about half of those who reported using transit time for this purpose. Again, none of the respondents used the data to aid in managing inventory. There were no significant differences in urban and rural responses, nor were there any significant differences in the type of business. It appears that very few shippers are effectively managing their logistics operations based on a total cost approach.

**Table 23**
**Importance of Transit Time Reliability by Community Size and Type of Business***

| Population | Retailers | Wholesalers | Manufacturers | Total |
|---|---|---|---|---|
| Less than 5,000 | 4.8 | 4.5 | 4.4 | 4.5 |
| 5,000<15,000 | 4.2 | 4.3 | 4.3 | 4.2 |
| 15,000<25,000 | 4.1 | 4.7 | 4.0 | 4.2 |
| 25,000<50,000 | 4.4 | 4.3 | 4.9 | 4.5 |
| 50,000 and over | 4.4 | 4.4 | 4.2 | 4.3 |
| Total | 4.3 | 4.4 | 4.3 | 4.3 |

* Based on a 5-point scale, where 5.0 is very important and 1 is not important at all.

**Table 24**
**Number and Percentage of Respondents Who Measure Transit Time Reliability**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Population | No | % | No | % | No | % | No | % |
| Less than 5,000 | 3 | 1.1 | 4 | 1.4 | 8 | 2.9 | 15 | 5.4 |
| 5,000<15,000 | 5 | 1.8 | 6 | 2.2 | 8 | 2.9 | 19 | 6.9 |
| 15,000<25,000 | 5 | 1.8 | 10 | 3.6 | 10 | 3.6 | 25 | 9.0 |
| 25,000<50,000 | 2 | 0.7 | 9 | 3.2 | 2 | 0.7 | 13 | 4.7 |
| 50,000 and over | 24 | 8.7 | 23 | 8.3 | 40 | 14.4 | 87 | 31.4 |
| Total | 39 | 14.1 | 52 | 18.8 | 68 | 24.5 | 159 | 57.4 |

**Table 25**
**Number and Percentage of Respondents Who Use Transit Time Reliability in Carrier Selection**

| | Retailers | | Wholesalers | | Manufacturers | | Total | |
|---|---|---|---|---|---|---|---|---|
| Population | No | % | No | % | No | % | No | % |
| Less than 5,000 | 2 | 0.7 | 1 | 0.4 | 0 | 0.0 | 3 | 1.1 |
| 5,000<15,000 | 4 | 1.4 | 0 | 0.0 | 2 | 0.7 | 6 | 2.2 |
| 15,000<25,000 | 3 | 1.1 | 3 | 1.1 | 3 | 1.1 | 9 | 3.2 |
| 25,000<50,000 | 1 | 0.4 | 0 | 0.0 | 0 | 0.0 | 1 | 0.4 |
| 50,000 and over | 3 | 1.1 | 7 | 2.5 | 7 | 2.5 | 17 | 6.1 |
| Total | 13 | 4.7 | 11 | 4.0 | 12 | 4.3 | 36 | 13.0 |

These results suggest a serious problem in logistics organizations. If shippers are to survive in an increasingly competitive environment, their operations must be managed as efficiently as possible. The lack of use of transit time and reliability data suggests that many shippers risk operating in a sub-optimal environment. Selecting carriers based on transportation cost alone may lead to increases in overall logistics costs, especially because of higher levels of inventory. Similarly, selecting carriers based on perceived service levels may lead to unnecessarily high transportation costs if the service levels are not sufficient to reduce inventory levels enough to off-set the higher cost of premium forms of transportation.

## CONCLUSIONS

Rural community markets have certain characteristics that make them more costly to serve than urban areas. Prior to deregulation some people feared that by relaxing entry and exit requirements, small communities would suffer from disproportionately high transportation cost, or inadequate service, or both. Various studies on the impact of deregulation on communities conducted during the 1980s revealed little or no effect on shippers. However, it is important to examine issues such as this over a longer time period. The purpose of this report was to assess whether motor carrier deregulation left small communities and shippers in those areas disadvantaged with respect to the cost and availability of motor carrier service, or whether carrier services are adequate to meet the needs of shippers in rural areas.

This study found results similar to those of earlier studies in that rural shippers do not seem to have a disadvantage relative to urban shippers with respect to firm performance as measured by growth in employees, revenues, and profits. Neither urban nor rural respondents tend to believe that their rates are better now than before deregulation, and there seems to be

consistent agreement that motor carrier service has not improved dramatically and that deregulation has not enhanced small communities' ability to attract new business, nor that it has been a completely positive experience.

Deregulation has had some effect on the modes used to move freight, but mainly for outbound shipments, and there are major differences in the changes that have taken place with respect to the type of business. While retailers have such small volumes of outbound freight that the differences there are virtually meaningless, wholesalers have reduced the use of private transportation and express services in favor of truckload and LTL services. Manufacturers seem to have reduced the use of LTL in favor of TL and rail shipments.

Results of the study also suggest that a serious problem exists in logistics organizations. Few shippers use transit time and/or transit time reliability data to select carriers and/or manage inventory levels. In this age of global competition, shippers should be looking for every advantage they can find. Logistics should be managed on a total cost basis, and incorporating carrier performance data with carrier prices is imperative if shippers are to survive in an increasingly competitive environment. Selecting carriers based on transportation cost alone may lead to increases in overall logistics costs, especially because of higher levels of inventory. Similarly, selecting carriers based on perceived service levels may lead to unnecessarily high transportation costs if the service levels are not sufficient to reduce inventory levels enough to off-set the higher costs of more expensive forms of transportation. The lack of use of transit time and reliability data suggests that many shippers risk incurring higher logistics costs than may be necessary, and many freight shipments are potentially misrouted. These problems do not appear to be related to whether shippers are in urban or rural areas or whether they are involved in retailing, wholesaling, or manufacturing.

While deregulation has undoubtedly made the motor carrier industry more efficient, shippers have not taken full advantage of the benefits that carriers have to offer. This may help explain why so many of the respondents in this study were not overly enthusiastic about the results of deregulation; the competitive environment has apparently not offered as much as was expected. Once the initial gains were realized, shippers settled back into a "business as usual" mode and are wondering where the next source of cost savings will come from.

Perhaps the next source will come from shippers adopting a total cost approach to managing their logistics operations; however, there has been little evidence to date to support that possibility. For this to occur, shippers must have a better understanding of how to manage their logistics operations. Unfortunately, an adequate understanding of how to manage logistics on a total cost basis is not something that can be gained by experience. The average level of experience of respondents in this study was to this survey over 17 years, and over 80 percent had 10 or more years of experience. Probably the best source of tomorrow's logistics professionals is from academic programs in business logistics. Unfortunately, there is a serious lack of qualified students to meet those needs. Currently, there are literally hundreds of business schools in the U.S., and over 350 are accredited by the American Association of Collegiate Schools of Business. However, there are fewer than 30 business schools that offer programs of study in the area of logistics, and those programs are typically very small, often with only one or two faculty members who have expertise in the area. Only about a dozen programs are offered by the large, major state universities. This is a problem that needs to be remedied if managers are to gain the knowledge necessary to effectively manage logistics operations and meet the demands of an increasingly competitive global market.

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