

REFRIGERATED TRUCKING IN THE INFORMATION AGE

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ABSTRACT

Trends in refrigerated trucking since the 1980s were examined. Owner-operators have maintained their importance, but are more likely to operate under leases. Equipment replacement and utilization rates are good. Finally, drivers express high levels of satisfaction with driving and compensation and the large majority intend to remain in the profession.

Key Words: refrigerated trucking, driver supply, brokers, transactions costs

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Trends in refrigerated trucking since the 1980s were examined. Owner-operators have maintained their importance, but are more likely to operate under leases. Equipment replacement and utilization rates are good. Finally, drivers express high levels of satisfaction with driving and compensation and the large majority intend to remain in the profession.

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Trucking is the dominant mode for transporting foodstuffs in the U.S.. Nowhere is this more true than with commodities requiring refrigeration. For example, over 95 percent of all interstate produce movements are by truck. The industry, however, faces significant challenges and opportunities. Technological changes, particularly those related to communications, may alter the comparative advantages of trucking and other modes. Such shifts would likely take several years or decades. Of more immediate concern, these communications technologies may transform the structure of the industry. In particular, owner-operators may become more or less competitive relative to larger firms and the role of intermediaries, i.e., brokers may change. Throughout the 1990s there was a general tightening in job markets and aging of the labor force, trends which are expected to continue. In addition, trucking is still adjusting to the economic reforms and deregulation in the 1980s and 1990s. Some contend that deregulation has had near catastrophic impacts on driver working conditions and compensation levels and that this is generating an ever worsening erosion in the supply and quality of drivers, e.g., see Belzer.

In this paper are presented the results of a study of long-distance, refrigerated trucking. The primary objective of the study was to identify changes since the 1980s which could indicate if and the extent to which technological and other factors are transforming this segment of the trucking industry. Primary focus was on: 1. the importance owner-operator and the degrees to which they are associated with larger carriers, 2. load arrangement methods, 3. equipment replacement and utilization, and 4. labor supply indicators.

Data

Data for the study are from interviews with 1,642 drivers of semis with refrigerated trailers. The survey sites were the Florida Agricultural Inspection Stations along U.S. I-10, I-75, and I-95. All trucks are required to stop at these stations, which are always open and cover all exits from the Florida Peninsula. There were four interview periods between November 2001 and June 2002. All drivers of semis with refrigerated trailers were invited to participate.¹ They were told that the survey was voluntary, anonymous, and given by students of the University of Florida. In all cases interviews were conducted out of hearing of the Inspection Officers. While it proved impossible to calculate exact refusal rates, at all Stations and during all interview periods, refusal rates were well under ten percent and there were no indications of non-response bias. To identify trends, comparisons are made between the results of the 2001/02 survey and similar surveys conducted in 1982/82 (see Beilock and Fletcher) and 1985/86 (see Beilock, MacDonald, and Powers).

¹ Unless there was no available parking space.

Industry Structure: Importance and Independence of Owner-Operators

The importance of owner-operators for refrigerated haulage appears to have increased modestly since deregulation. In the early and mid 1980s, owner-operators accounted for between 50 and 53 percent of the refrigerated trucks exiting the Florida Peninsula. In the 2001/02 survey, 57 percent of the trucks were driven by owner-operators.

Operational Independence

The continuing, even growing, importance of owner-operators suggests that, at least in this segment of the motor carrier industry, the events of the past two decades have not eroded the competitive positions of small firms. With regard to haulage of produce and perhaps some other commodities which never fell under Federal regulation, this is probably an accurate conclusion. This follows because these commodities are usually moved in truckload or near-truckload shipments and both small and large carriers normally deal directly with shipper/receivers or their representatives (e.g., see Beilock, MacDonald, and Powers). However, refrigerated carriers normally must also haul other types of cargoes if they are to avoid excessive amounts of empty movements. For example, the drivers in the 2001/02 survey were asked what they were carrying when they entered Florida. Seventy-four percent of these loads formerly were subject to economic regulation.² As relatively few owner-operators had ICC Authority to haul regulated commodities (only 21 percent of those in the 1985/86 survey), many leased their services to larger carriers. While legally a carrier under lease is still an

² Technically, some regulation remains. However, as a practical matter, it is non-existent.

independent firm, in many regards it is little more than part of a larger carrier's fleet.³ As such, a fuller picture of the degree to which smaller firms are maintaining their positions can be obtained through examining their reliance on leasing.

With the effective sunset of economic regulations, the legal impetus to operate under a lease for owner-operators without ICC Authority disappeared. However, leasing may still be advantageous for owner-operators if larger carriers have comparative advantages with regard to marketing. In addition, leasing can give owner-operators access to linehauls for less-than-truckload movements. Indeed, it appears that leasing has become much more common. Thirty-five percent of the owner-operators in the 1982/83 survey were then operating under a lease agreement. Despite the elimination of legal restrictions which encouraged leasing, 65 percent of owner-operators in the 2001/02 survey were under a lease. Probable reasons for this include: larger carriers being better able to exploit new technologies to provide Just-in-Time, Electronic Data Interchange, and other services increasingly demanded by shipper/receivers. Moreover in the post-regulation era, larger carriers may utilize leasing as a strategy to minimize fixed and quasi-fixed costs, facilitate more rapid expansions and contractions in capacity, and reduce reliance on unionized labor (e.g., see Belzer).

Particularly if owner-operators are able to move readily from one lessor to another, as well as operating independently, the increased reliance on leasing may be an appropriate and efficient way for owner-operators to access marketing and other services which would be difficult for them to provide and for larger carriers to maintain flexibility for their fleets. On the other hand, it may constitute a de facto increase in concentration

³ Normally, a carrier under a lease makes its own decisions regarding equipment maintenance and replacement, and tags and taxes. However, the lessee hauls loads at the direction and in the name of the lessor and may be subject to the lessor regarding routings and driving times and speeds.

and be indicative of reduced profitability and flexibility for owner-operators.

Unfortunately, the answers to these questions are beyond the scope of this study.

Brokers and the Internet

Brokers have traditionally been the dominant method for arranging transport of produce (e.g., see Taff). The frequency of their use for produce haulage from Florida has remained essentially unchanged for the past 20 years. In the 1982/83 survey, 59 percent of these loads were arranged by brokers, compared to 62 percent in 2001/02. As might be expected, owner-operators are more likely to use brokers than larger carriers, however the difference is small, 66 and 58 percent, respectively. With development and expanded use of communications technologies, such as cell phones, faxing, and the Internet, the ability of brokers to maintain their market share is somewhat surprising. Added to this, on average brokers are charging more for their services. In the 1980s, an 8 percent fee was by far the most common, with some charging as high as 10 percent, but rarely higher, e.g., see Shell. In the 2001/02 survey, the average brokerage fee was 11 percent. Fifty-six percent of those using brokers reported fees of 10 percent, with an eighth of these drivers reporting 8 percent fees and another eighth being charged 12 percent.

But what about the Internet? When asked if they ever have used the Internet to hunt for loads, two thirds of the owner-operators responded positively. However, the Internet appears to be of marginal importance, at best. Less than one percent of the owner-operators indicated that the load on their trucks, at the time of the interview, had been secured through the Internet.

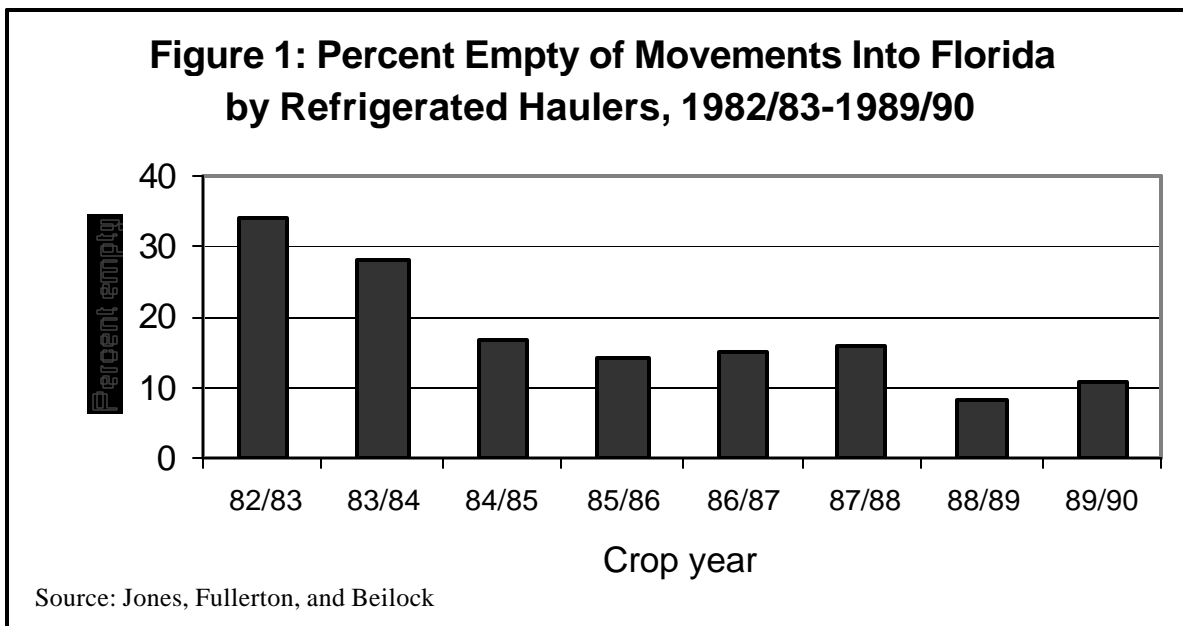
Equipment Utilization

One of the key determinants of a transport system's efficiency is the ability to utilize its capacity over a large percentage of movements, that is, to have low percentages of empty movements. As previously alluded to, refrigerated carriers primarily haul never-regulated cargoes from Florida and formerly-regulated cargoes into the state. Not surprisingly, when regulatory controls were in force, they impacted on the ability of carriers to secure loads of regulated, but not unregulated commodities (at least not to significant extent). Indeed, the contention that elimination of regulatory controls would improve equipment utilization was one of the primary arguments in favor of deregulation, e.g., see Felton.

In the early years of the regulatory reforms which led to deregulation, the percent of refrigerated truck entering Florida empty was four times as high as for their movements out of the state (34 versus 8 percent, respectively, in 1982/83). That these high empty movement rates into Florida were, in large measure, due to regulation was strongly suggested by the fact that Florida is a net importer of goods from virtually every other U.S. State and Canadian Province, see Kilmer, Ramirez, and Steglin. Consistent with the assertion that reduced regulatory controls improved utilization rates, throughout the 1990s the percentage of empty outbound movements [primarily of never-regulated commodities] remained in the 8-to-11 percent range, while the percentage of empty inbound movements fell, see Figure 1.

An important question addressed in the 2001/02 survey was if the improvements in utilization rates witnessed in the 1980s have been maintained. The results indicate further improvements with regard to movements of formerly-regulated cargoes into

Florida. Outbound, the empty movement rate has remained at levels seen in the 1980s, 11 percent. However, inbound slightly less than 5 percent of the refrigerated trucks entered Florida empty, half the rate attained at the end of the 1980s. But are the ‘right’ empty movements being made. Beilock and Kilmer presented theoretical arguments that efficient transport systems would be characterized by higher empty movement rates for shorter, than longer, distances. They also observed this in the 1980s with regard to movements by refrigerated carriers into Florida. Similar results were found for the 2001/02 survey. For outbound movements with loads the average distance was 1,258 miles, versus 557 miles for empty movements. With regard to inbound movements, the averages were 943 and 584 miles, respectively, for full and empty trucks. These results strongly suggest that the benefits of deregulation have been substantial. It should be stressed, however, that some of the observed improvements could be due to technological developments. However, it seems likely that if technology were the primary cause improvements would also have been observed with regard to outbound movements.



Utilization Rates of Owner-Operators and Fleet Drivers

The incidences of empty movements outbound from Florida are nearly identical between owner-operators and fleet drivers are , 10.2 and 11.9 percent, respectively. However, the average empty outbound movement by owner-operators is somewhat longer than those made by fleet drivers, 925 versus 800 miles. Multiplying empty movement frequency by distance, the average owner-operator travels empty from Florida 94 miles, versus 95 miles for the average fleet driver. So, with regard to outbound movements, owner-operator utilization rates are effectively identical to those of the fleets.⁴

For inbound movements, differences persist between the fleets and owner-operators. Just under 7 percent of the inbound movements by owner-operators were empty, compared to 3.2 percent for fleet drivers. It should not be concluded that owner-operators are seriously disadvantaged in this regard relative to the fleets. These results indicate substantial improvements for owner-operators, both absolutely and relative to fleets. In the early 1980s, empty inbound movement rates for owner-operators hovered around 40 percent, nearly four times the rate for fleets. Also, while the incidence of empty inbound movements is higher for owner-operators, than for the fleets, the average empty movement is shorter, 511 and 687 miles, respectively. Therefore, the average owner-operator traveled empty towards Florida 35 miles, compared to 22 miles for the average fleet driver.

⁴ That is, assuming that the times are the same in which both types of carriers are able to secure loads or decide to move empty.

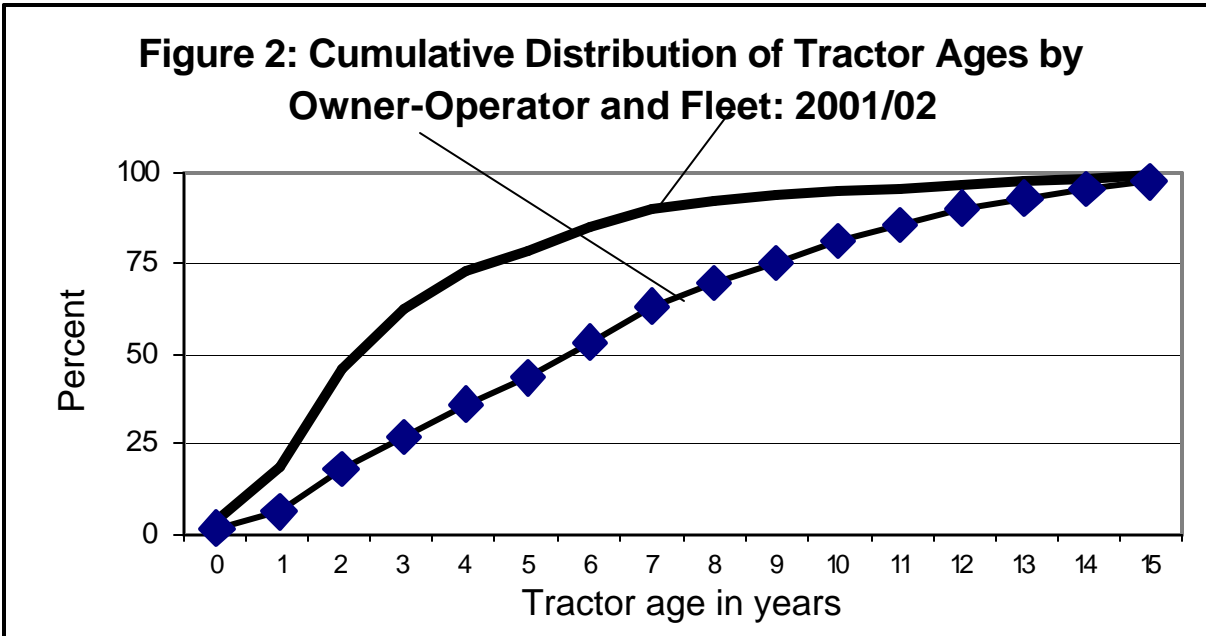
Equipment Ages

A potential indicator of financial condition, as well as safety, is the age of the equipment used, the tractor and trailer. It should be stressed, however, that this is an imperfect measure as good maintenance and driving practices can greatly lengthen the useful lives of equipment. For example, the world's largest trucking company, UPS, consistently ranks as one of the safest and oldest fleets in North America.

Unfortunately, equipment ages were not analyzed for refrigerated carriers operating into and out of Florida during the 1980s. However, at the same survey sites used for the refrigerated carrier survey, in 1987 there was a survey of all long distance carriers, see Beilock. In that survey, the average tractor was 4.9 years old and the average trailer was 5.0 years old. Owner-operators had somewhat older equipment than the fleets: respectively, 6.2 and 4.0 years for tractors and 6.0 and 4.4 years for trailers. The results for 2001/02 survey are similar. The average tractor was 4.9 years old and the average trailer was 6.2 years old.⁵ Also as in the 1987 survey, owner-operators were found to have older equipment, on average, than fleets. The average tractor driven by an owner-operator was 6.2 years old, compared to only 3.8 years old for the fleet tractors. As can be seen in Figure 2, the median tractor age for owner-operators was over 5 years, effectively twice that for the fleets. Trailers pulled by owner-operators were, on average, 6.75 years old, versus 5.3 years old for the fleets. Overall, the equipment ages suggest that the industry has been able to replace its equipment in a timely fashion. Without further research, it is impossible to conclude if the disparities between owner-operators

⁵ Comparisons might also be made with equipment ages reported in a 1999 study of trucking serving the California produce industry, see Hagen, Minami, Mason, and Dunton. They found average tractor and trailer ages of 3.0 and 4.7 years, respectively. However, the representativeness of these estimates is questionable as their survey included a fairly small number of trucking firms (44) which were all members of an American Trucking Associations conference.

and fleets, particularly with regard to tractor ages, are indicative of financial problems for the former.



Driver Supply

Since at least the early 1980s, there have been growing concerns about the supply of drivers, particularly for long-distance haulage. There are two primary reasons for these concerns. First and foremost, some contend that economic deregulation of trucking has put the adequacy of supply into jeopardy both because it has increased demands for trucking, due to lower rates and improved services, and because it has led to a worsening of driver compensation levels and working conditions, e.g., see Belzer. Second, competition for labor is increasing because the labor force is aging and shrinking relative to the total population, e.g., see Fullerton. In this discussion, we will investigate primarily the first concern, that driver compensation levels and working conditions are eroding.

Age Structure

If working conditions and pay have been deteriorating in trucking over the past 20 years, drivers would tend to be older, on average, than the labor force as a whole. This follows because younger individuals would have greater incentive, than their older counterparts, to make the investments and take the risks necessary to switch to better occupations as they have more future work years over which to spread these costs. Moreover, as conditions in trucking deteriorated, relative to available alternatives, fewer new entrants into the labor force would choose driving as an occupation.

The average age of drivers in the sample was 44.4. The Bureau of Labor Statistics (BLS) data on the labor force (see Fullerton) includes workers as young as 16. To be comparable with the labor force for trucking, it was necessary to remove those under 21, who would be too young to acquire a Commercial Drivers License.⁶ With this modification, the average age of U.S. labor force participants in 1998 (the most recent year reported) was 40.5.⁷ One further modification seemed in order. While the oldest driver in the sample indicated that he was 78 years of age, there were very few drivers older than 74. Given the requirements of this occupation it seems likely that most individuals would be physically unable to continue driving into their late 70s. For that reason, the BLS data was further modified to eliminate their oldest category, “75 and older.” The impact of this modification was minimal, resulting in an average age of 40.2.⁸

⁶ BLS uses age categories 16 through 19 and 20 through 24. The former was entirely removed and 20 year olds were assumed to equal 20 percent of the latter category

⁷ Fullerton reported the number of labor force participants by eight age categories. Average age was calculated by: 1. dropping the youngest category (16 through 19), 2. using age category midpoints as the age of all those in an age category, and 3. assuming age 75 for those in the “75 and older” age category.

⁸ Indeed, even eliminating those age 65 and older only lowers the average age to 39.5.

The 4.2 year difference between the average ages of those in the truck driver sample and the U.S. labor force (i.e., 44.4 – 40.2), while not necessarily alarming, is sizeable enough to question if some who in past years would have become drivers are beginning to avoid the profession. The main difference in the age distributions of drivers and the overall labor force, which also is the principle cause of the difference in average age, is the much smaller percentage of the former who are 21-to-24 compared with the labor force as a whole, 2.4 versus 11.2 percent, respectively. This could be due to one or more of the following:

1. Eroding conditions in trucking, relative to other professions, are discouraging selection of driving by those entering the labor force.
2. Due to CDL age restrictions, new drivers are entering later than previously.
3. Entrants into driving always tended to be older than for the population as a whole.

Certainly, because of the CDL age requirement, it would be expected that a smaller percent of drivers would be 21-to-24 than for the entire labor force, but the extent of the difference suggests other reasons, i.e., eroding conditions and/or traditionally late entry. To gain some insight into trends in the ages of entrants into driving, median entrant ages into driving⁹ were calculated by current driver age groups. The results suggest that late entry into driving is not a recent phenomenon. For drivers currently aged in their 30s and above, the median age of entry ranges between 25 and 26. So, regardless of current age, half the drivers first entered the profession when they were in their mid-20s or older. This result may, in part, be an artifact of the rapid growth of the profession since

⁹ Entrant age into driving was calculated as a driver's current age minus the number of years he/she reported to have been in the profession.

deregulation.¹⁰ If unusually large numbers of older workers entered in recent years, median ages would have been elevated. However, it seems unlikely that this, alone, would have generated the essentially flat median ages across all current driver age groups. Even if median entry ages are high because of recent entry of older workers, this could portend a good, even improving, labor supply situation. After all, the entire labor force is aging, e.g., see Fullerton. The extent to which a significant amount of the rapid growth (effectively doubling) in driver numbers since deregulation has been through attracting older individuals, demonstrates the profession's ability to draw from the most rapidly growing part of the labor force.

Enjoyment Of Driving

As with any profession, individuals tend to self-select according to job characteristics they prefer. Nevertheless, if working conditions have been deteriorating, overall enjoyment levels would be expected to be low. However, when asked if they enjoyed being truck drivers, 85 percent of the drivers responded affirmatively. If an erosion in conditions was associated or coincident with deregulation, those who drove during the relatively good pre-deregulation era might be less likely, than more recent entrants, to enjoy driving. There is some evidence that this is the case, though enjoyment levels are high across all cohort groups. Drivers were divided into those who entered the profession before 1980 and those who entered after 1989. Entrants during the 1980s were omitted as that decade, arguably, was a transition period.¹¹ Across the entire sample, 81 percent of those who entered the profession prior to 1980 reported that

¹⁰ Between 1965 and 1980, the number of production workers in trucking increased at an average annual rate of 2.1 percent, compared with 3.7 percent between 1980 and 1995. Between 1980 and 1995 the number of production workers in trucking nearly doubled, Belzer, p. 92.

¹¹ Including entrants during the 1980s in the post-deregulation group does not alter the direction of the results, though the resulting pre- and post-deregulation differences become smaller.

they enjoy driving, compared to 88 percent of those who entered after 1990. This difference is largest among owner-operators (78 and 89 percent, respectively, for pre- and post-deregulation entrants). Among drivers for fleets the difference is slight (83 and 88 percent, respectively). It should be noted that differences in driving enjoyment may, in part, be due to age. The average age of drivers who entered the profession before 1980 was 55, while the average age of those who entered after 1989 was 38.

Perceptions Regarding Earnings

Drivers were asked if they considered their earnings to be poor, average, or good. Only 19 percent of all drivers characterized their pay as being poor, while nearly twice that amount said that earnings were good. Owner-operators were more likely than company drivers to report poor earnings (23 and 16 percent, respectively). But for both groups, those perceiving earnings as good outnumbered those believing the opposite and the overwhelming majorities indicated that compensation was average or better.

If driver earnings were impacted negatively by or coincident with deregulation, it would be expected that drivers who enjoyed pre-deregulation era earnings would tend to be less satisfied than their counterparts who entered the profession after deregulation. To examine this, drivers were again divided into two groupings, those who entered the profession before 1980 and those entering after 1989. As earnings trends might be different for owner-operators and company drivers, this distinction was also made. Consistent with a negative earnings trend between the pre- and post-deregulation eras, only 18 percent of the owner-operators who never experienced pre-deregulation conditions categorized current earnings as poor versus 30 percent of those who entered trucking prior to 1980. While there may have been deterioration in earnings since

deregulation,¹² the overall assessment of earnings was still positive. Even among the owner-operators who entered trucking prior to 1980, slightly more categorized earnings as good than saw earnings as poor and nearly 40 percent indicated that they were average. Among owner-operators who entered after 1989, more than twice as many viewed their earnings as good than the reverse. Among company drivers, differences were less pronounced regarding earnings assessments between those who entered before or after deregulation. Almost identical percentages of those who began driving before and after deregulation described their earnings as poor (17 versus 14 percent, respectively). The primary difference was that more of those who entered after deregulation felt their earnings were good, relative to those who entered before deregulation (44 versus 34 percent, respectively).

Commitment To Driving

To gauge commitment to their profession, respondents were asked if they believed they still would be driving in five years. Across the entire sample, 63 percent of the drivers responded positively, 10 percent were unsure, and 27 percent said no. Because of retirement plans and biological limitations, older drivers would be expected to be less likely to anticipate driving in five years. This is the case. Through their 40s, approximately 70 percent of drivers believe they still will be driving in five years and another ten percent are unsure. Sixty-one percent of drivers in their 50s believe they will still be driving in five years, with another ten percent uncertain. Not surprisingly, much smaller percentages of drivers age 60 and older anticipate driving in 5 years. There are

¹² A key rationale for deregulation was the belief that the regulatory structure allowed trucking firms to reap monopoly profits. If true and if deregulation has worked as intended, it would be expected that owners of many trucking firms, including owner-operators, would have seen reductions in earnings.

no significant differences, in these regards, between owner-operators and company drivers nor between those who entered the profession before or after deregulation.¹³

Summing Up

Transport of refrigerated foodstuffs in the U.S. is almost totally dependent on trucking. To understand better this segment of the motor carrier industry, results were presented from a 2001/2 survey of over 1,600 drivers of long-distance refrigerated trucks as they exited the Florida Peninsula. Comparisons were made with similar surveys taken during the 1980s. The results indicated that owner-operators have maintained and even increased their importance over the past two decades, now accounting for 57 percent of all refrigerated trucks. While two thirds reported using the Internet to find loads, the actual impact of this technology appears slight. Less than one percent of the owner-operators had arranged their current load in this manner. Moreover, roughly twice the percent of owner-operators reported they were leased to larger carriers as did in the 1980s. This may be a mutually beneficial adjustment for owner-operators and fleets to changed economies of size regarding marketing and communications or signal that the operational freedom and competitiveness of owner-operators are eroding. With regard to produce haulage, approximately 60 percent of these loads for both owner-operators and fleet carriers are arranged through truck brokers. This is essentially unchanged since the early 1980s. However and of some surprise, broker fees have increased, on average, from around 8 percent of the freight rate to 11 percent. Analyses of equipment ages suggest adequate-to-good replacement rates. Fleet carriers have somewhat younger equipment than do owner-operators, on average. Equipment utilization levels, as gauged

¹³ Except, of course, that higher percentages of pre-deregulation entrants are older drivers and, as such, less likely to anticipate driving in five years.

by percent empty miles, improved throughout the 1980s, presumably due to reduced regulatory controls. The incidence of empty movements into Florida fell from 40 percent in 1982/83 to about 10 percent by the end of the decade. The results of the 2001/02 survey indicate continued improvements, with empty inbound rates around 5 percent. Finally, indicators of driver supply were examined. Despite contentions by many associated with the industry that the quality and quantity of drivers are declining due to worsening working conditions and pay, the findings indicate high levels of satisfaction with driving and compensation and the very large majority of drivers expressed their intentions to remain in the profession.

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