A Study of Drayage at the Ports of Los Angeles and Long Beach

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December 15, 2004

ACKNOWLEDGEMENTS

We wish to acknowledge the financial support of METRANS. Special thanks is due to Charles Abbott, an undergraduate economics major at CSULB (now an alumnus), who worked on all aspects of data collection for this project. We would also like to thank Miguel Lopez, Claudia Zapata, and Vanessa Berry for their help with the Spanish version of the driver survey. Finally, we wish to acknowledge Jennifer Bailly for her assistance in data collection for the firm-level survey, and the International Brotherhood of Teamsters for assistance in accessing names and addresses of port drayage companies.

INTRODUCTION

As volumes of imports to the U.S. continue to grow, there is increased pressure on terminals, railroads, trucking companies, and shippers to increase throughput at the nation's ports. Currently the ports of Los Angeles and Long Beach combine to be the third largest container port in the world (Journal of Commerce (6/14/2004). In 2003, 6.7 million TEUs moved through the Port of Los Angeles (www.portoflosangeles.org) and 4.66M TEUs moved through the Port of Long Beach (www.polb.com).

One key component of the vertical chain involved in transoceanic shipping is port drayage. Though a portion of the container traffic coming into the ports leaves the complex on rail, there is limited capacity built into the Alameda Corridor and, given the anticipated growth in port volumes over the next 20 years, it is unlikely that the percentage of freight moving by truck will decrease in the future. A key question is how port drayage can be made more efficient in the future. In order to answer this it is important to understand the current situation facing both firms and labor in this segment of the industry.

The goal of this research is to provide insight into the port drayage industry, by providing detailed information on both the drivers and the firms. Three sources of data are used, all of which were collected specifically for this study. The first source is a comprehensive data set of the wages and worklives of 175 port drivers. This data is used to examine the socioeconomic characteristics of this workforce as well as to examine pay and safety issues.

The other two data sets were obtained from port drayage companies. We conducted a survey of 32 drayage companies, with a focus on firm characteristics,

operations, dispatching, and use of technology. Finally, we obtained a sample of truck turn times from three medium-sized port drayage companies, to obtain preliminary descriptive statistics on how truck wait times differ across terminals and time.

TRUCK DRIVERS AT THE PORTS

While national data sets such as the Current Population Survey, Panel Study of Income Dynamics, and National Longitudinal Study of Youth provide detailed data that is typically used in wage studies across occupations, these data sets do not contain information that would allow researchers to distinguish port drivers from long haul drivers or any other subgroup of this occupation. There are some data sets that specifically collect data on truck drivers, however, these typically focus on long-haul and local drivers not involved in port drayage. To examine port drivers specifically it was necessary to collect original data. A survey of drivers working at the Port of Long Beach was conducted in April and May 2004.

Focusing on drivers involved in port drayage specifically is relevant from two perspectives. First, there has been great concern about security at the nation's ports and some of this scrutiny has been placed on drivers. Who are the drivers who have access to the freight coming into the country? Second, the labor market circumstances of port drivers, most of whom are nonunion owner operators (especially at the California ports) stand in sharp contrast to the labor group within the gates of the port – the longshoremen and clerks. The latter group is unionized, with wages considerably higher than workers of similar skill level.

There is very little known about these drivers. Anecdotal evidence suggests that they possess low levels of education, are often new to the country, and typically earn less than drivers in other segments of trucking. The purpose of this study is to use data from surveys of drivers at the Port of Long Beach to better describe this labor force, with an eye towards examining rates of pay, their worklives, and safety issues.

It is important to understand the nature of the work of these drivers. Though most are owner operators, they do not typically operate with their own authority – they contract with harbor drayage companies. Given that these drayage companies typically do not have any employee drivers, they seem to serve as brokers, linking drivers and loads. Port drayage drivers are dispatched by the firms and proceed to the terminal where the load is to be picked up or dropped off. Though some terminals at the Port of Long Beach have appointment systems it is typical that these are not used (or only used for the first trip of the day). The driver waits for the proper load inside the terminal and is provided this load on a chassis that is typically owned or arranged by the ocean carrier. The driver then leaves the port and delivers the load (typically to a local destination). The nature of this work leads to several questions. First, how is the driver paid? Second, how much of the driver's time is spent waiting? Third, what are the safety issues facing drivers in this segment of the industry?

Description of the Data Set

The sampling scheme for the survey had two components. First, three container terminals at the Port of Long Beach were randomly chosen. Surveys were conducted at two of these terminals. The third was not used due to the physical structure outside the

gate being inhospitable to surveying. Surveys were conducted before the gates opened, from 6am-7am. The security people at the terminals requested that we leave the premises before the gates opened at 7am to ensure our safety once the lines of trucks began moving. The surveying was conducted during one week in April 2004 and one week in May 2004. The survey days included every weekday.

The second component of the sampling scheme involved choosing the drivers to participate in the survey. All drivers who were at the wheel of their truck or standing outside their truck were approached and asked to participate in the survey. Drivers who were asleep in their bunk were not approached. The survey instrument was a self-administered questionnaire. Drivers were given a choice of taking the survey in English or Spanish. The refusal rate was approximately 35 percent, which is lower than the 50% refusal rate common to surveying where there is only one opportunity to approach the subject. The survey was self-administered in order to increase the sample size during the short sampling window. The resulting sample size is 175 drivers (a copy of the survey instrument is presented in Appendix A).

While we do not believe that we can consider the data representative of port drivers at the national level, we do believe the sampling scheme and participation rate allowed us to capture data representative of drivers who haul containers to and from the terminals at the Ports of Los Angeles and Long Beach.

Operations

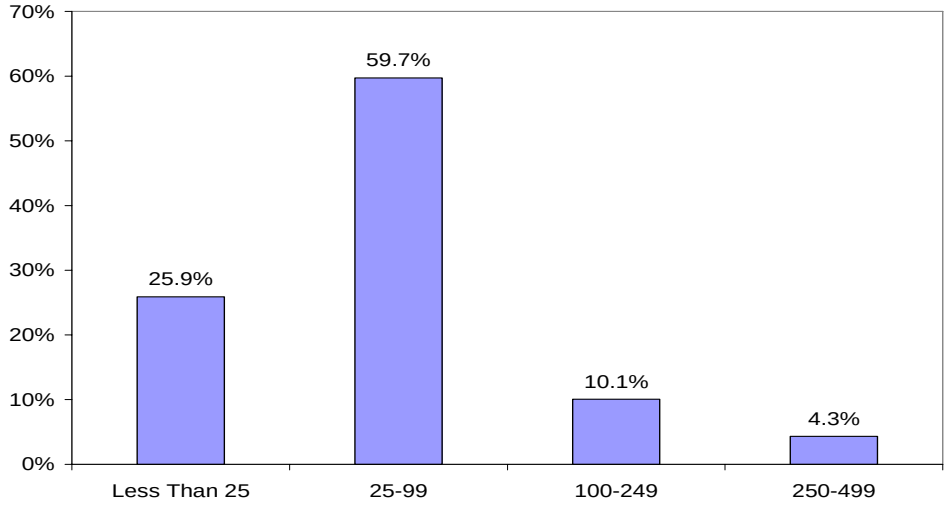
There are several types of hauls performed by drivers at the Port. Primarily, drivers are engaged in landbridge, delivery to the Inland Empire (the counties to the East of Los Angeles in Southern California), and local delivery. Approximately 20 percent of

the drivers in the sample were involved in long-haul trucking. The focus of this report is on the drivers engaged in short hauls (regional or local), so we eliminate the long-haul truckers from our sample. This leaves us with a sample of 145 drivers.

The bulk of these drivers reported that driving was a full-time year round job for them (95.77 percent). Most of the drivers self-identified as owner operators. Only13.1 percent reported that they were employees of a firm. The proportion of truck drivers who are owner operators nation-wide is largely unknown, but is commonly estimated at 10 percent. The employment relationship of port drivers is nearly the mirror image of this. Drivers were asked about the ownership of their trucks. In keeping with the employment information, 81.6 percent reported that they owned their trucks, 4.3 percent lease their trucks, and 14.2 percent neither own nor lease their trucks.

All drivers were asked about the number of drivers who work for the company they were currently driving for (Figure 1). It is apparent that many of these firms are quite small, with no drivers reporting firms that use over 500 drivers, and approximately 85 percent reporting between one and 99 drivers, 10 percent reporting between 100 and 249 drivers, and 4.3 percent reporting between 250 and 499 drivers.

Figure 1: Number of Drivers Who Work for Current Firm



Drivers were asked a series of questions about dispatching. First, they were asked whether they were given a list of tasks at the beginning of the day. Nearly 50 percent (47.5 percent) replied in the affirmative. Next, drivers were asked whether they were informed of their next task at the completion of the previous task or whether they were informed of their schedule in intervals. Slightly more than 80 percent (80.5) reported that they were informed of their next task at the completion of their previous task and 19.5 percent reported being informed of their schedule in regular intervals of one to three hours.

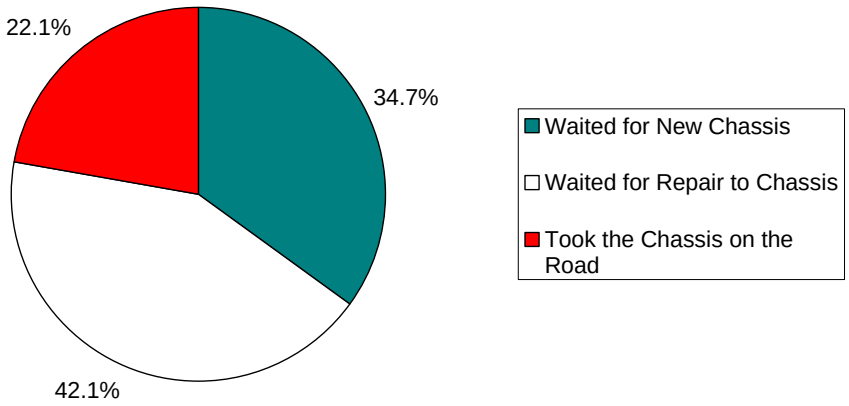
For most firms, the pick up and delivery of containers at the Port is a time-sensitive activity. Drivers were asked a series of questions regarding deadlines and incentives or penalties associated with these deadlines. Approximately three-quarters of drivers (74.8 percent) reported that they were subject to strict deadlines for pick-up or delivery of containers. When asked whether the trucking company would incur penalties for not meeting the deadline, 41 percent replied in the affirmative. Relatively few drivers

(5.3 percent) reported that the firm or driver received any incentives for early delivery of containers.

Chassis safety is a topical issue in port drayage. The ownership of the chassis rests with the ocean carriers and it is often suggested that they are not properly maintained. While chassis maintenance is not the responsibility of the driver, they are typically held responsible if they are stopped and found to be pulling a chassis that is not roadworthy.

Nearly 50 percent (46.1) of drivers reported that they had been given a chassis that was not roadworthy in the 30 days prior to taking the survey. The survey next asked how the driver dealt with the bad chassis the most recent time he received one (Figure 2). Over one-third (34.7 percent) reported that they waited for the chassis to be repaired, 42.1 percent reported that they waited for a new chassis, and 22.2 percent reported that they took the bad chassis on the road. Anecdotally, several drivers mentioned to the survey team that they were hassled by workers at the terminals if they refused to take bad chassis too often, or if they spent too much time inspecting the chassis themselves.

Figure 2: How the Driver Dealt with a Bad Chassis



In a final question related to safety, drivers were asked whether they had received a moving violation while on-duty in the 12 months prior to taking the survey. Slightly over 50 percent (51.1) reported that they had received a moving violation and 48.9 percent of drivers reported that they had not.

Work, Pay, and Benefits

Drivers were asked a series of questions designed to find out about the hours they work, the pay they earn and whether they have any benefits. Most drivers involved in port drayage are paid by the trip. Common among long-haul drivers and port drivers seems to be the goal of increasing income by working long hours. Long haul drivers typically are paid by the mile, and typically seek to maximize their annual mileage to achieve a certain income level. For port drivers, the goal is to complete a certain number of turns (or trips) per day.

Drivers work (defined as hours spent waiting plus driving) an average of 11.2 hours per day (Table 1), slightly higher than the median of 10 hours, indicating that some drivers are working long hours. It is notable that the lowest 10 percent of drivers report working nine hours in a typical day – longer than the typical work day for most full-time workers. At the upper end of the distribution, 10 percent of drivers report working 14 hours or longer in a typical day. The mean and median number of trips a driver is able to complete in a typical day is 3, though some drivers report completing 5 trips, these are drivers making very short local hauls, as opposed to the more common hauls to the Inland Empire.

Drivers were asked two questions specifically about the last trip they had completed (the last one completed before the survey, which presumably occurred sometime in the prior work day) (Table 2). The mean total hours spent driving and waiting in the previous trip was 4.6, slightly higher than the median of 4 hours. The bulk of this time is spent waiting. The mean waiting time was 2.6 hours, with a median of 2 hours. One average, waiting time accounted for between 50 and 66 percent of the total trip time.

Table 1: Hours and Trips in a Typical Day

Number of Hours Worked in a Typical Day		
	Mean	11.2
	10^{th} percentile	9
	25^{th} percentile	10
	50^{th} percentile	10
	75^{th} percentile	12
	90^{th} percentile	14
Number of Trips in a Typical Day		
	Mean	3.14

	10th percentile	2
	25th percentile	2
	50th percentile	3
	75th percentile	4
	90th percentile	5

Table 2: Total Hours and Waiting Time in the Last Trip

Total Hours in the Last Trip		
	Mean	4.6
	10th percentile	2
	25th percentile	3
	50th percentile	4
	75th percentile	5
	90th percentile	8
Hours of Waiting Time in the Last Trip		
	Mean	2.6
	10th percentile	1
	25th percentile	1.5
	50th percentile	2
	75th percentile	3
	90th percentile	4

Drivers were asked about the amount they would be paid for their current trip. Many drivers did not respond to this question, however, the mean reported pay was $94, with a median of $65. As the trip length differs by the type of haul, a better measure of pay would involve measuring the pay in the last pay period and dividing this by the days worked in that pay period to arrive at a pay per day measure, which is comparable across drivers.

The mean pay in the last pay period is $1194, with a median of $1095 (Table 3). Most drivers report being paid weekly, with the mean and median days worked in that pay period at 5. The mean pay per day is $235, slightly higher than the median of $200.

The lowest 10 percent of drivers earned $100 or less per day and the upper 10 percent earned $325 or more per day. As most of the drivers in the sample are owner operators, these figures overstate their labor earnings since these drivers must pay for their trucks, maintenance, insurance, and fuel.

We asked drivers to report their pay in 2003 net of truck expenses (Table 4). The average driver earned $29,903 in 2003, with the median at $25,000. These earnings are 25.4 percent lower than inflation-adjusted earnings of owner operators from the 2000 Current Population Survey ($36,792) and 12.2% lower than nonunion employee drivers from the CPS ($34,076).

Table 3: Amount of Paycheck and Days Worked in the Last Pay Period

Amount of Last Paycheck		
	Mean	$1194
	10th percentile	$600
	25th percentile	$800
	50th percentile	$1095
	75th percentile	$1400
	90th percentile	$1716
Days Worked in the Last Pay Period		
	Mean	5.15
	10th percentile	5
	25th percentile	5
	50th percentile	5
	75th percentile	5
	90th percentile	6
Pay Per Day in Last Pay Period		
	Mean	$235
	10th percentile	$100
	25th percentile	$160
	50th percentile	$200
	75th percentile	$260

	90th percentile	$325

Table 4: Income Last Year, Net of Truck Expenses

Income Last Year, Net of Truck Expenses		
	Mean	$29,903
	10th percentile	$10,000
	25th percentile	$18,000
	50th percentile	$25,000
	75th percentile	$38,000
	90th percentile	$55,000

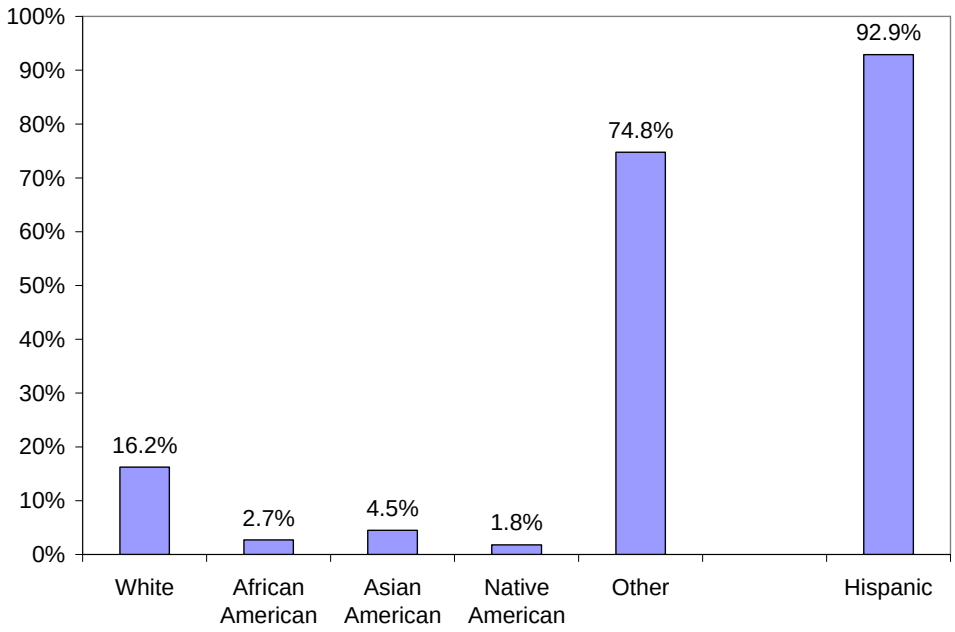
Finally, drivers were asked about benefits. Since the majority of the drivers are self-employed, they are highly unlikely to be provided any benefits from their firms. The drivers were asked whether they had a pension or retirement plan and whether they had health insurance. It must be noted that since they survey was designed to be quite short, we did not ask about the source of these benefits (company, spouse, private purchase) or whether there was a shared contribution to these benefits. Nearly all the drivers (95 percent) reported that they had no pension or retirement plan. Only 10 percent of drivers reported having health insurance.

Demographics

The sample of drivers is overwhelmingly male (99.3 percent), even more so than national data on truck drivers, which indicates roughly 5 percent of the workforce is female (Belman et al 2004). The mean age of drivers is 40.4 years, slightly higher than the national data on truck drivers. Ten percent of drivers in the sample were 30 years or younger and ten percent were 52 years or older.

In keeping with national surveys, questions on race and ethnicity were asked separately (Figure 3). Drivers were first asked to identify their race: White (16.22 percent), Black (2.7 percent), Asian American (4.5 percent), Native American (1.8 percent), or Other (74.77 percent). Respondents were then asked whether they consider themselves Hispanic (92.9 percent). This number is significantly higher than national data on truck drivers, where approximately 10 percent of drivers report Hispanic as their ethnicity (Belman et al 2004), but not surprising given the demographics of Southern California and the characteristics of the truck driving occupation.

Figure 3: Race and Ethnicity



Only 11.4 percent of drivers reported that they were born in the U.S. Over fifty percent (56.9 percent) reported that they were U.S. Citizens. This could be considered an upper bound as some drivers may have been concerned about reporting their true status. Drivers were not asked whether they were legally eligible to work in the U.S.

Most drivers are married (Figure 4), with 9.2 percent divorced, five percent separated, less than one percent widowed, and 6.8 percent single, never married. The mean number of children is 2.4, with the number of dependent children reported lying in the range between zero and nine (Figure 5).

Figure 4: Marital Status

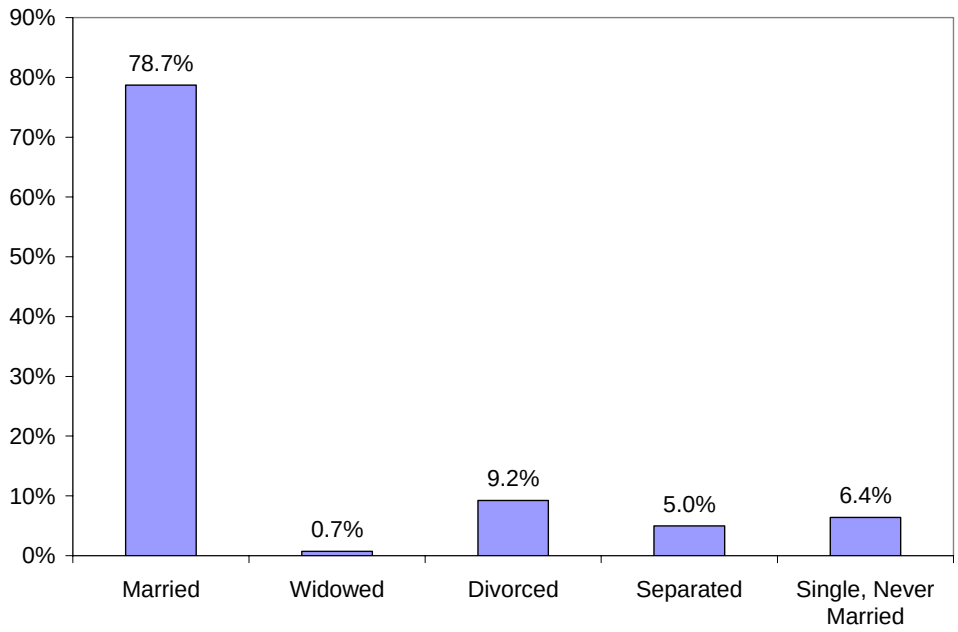
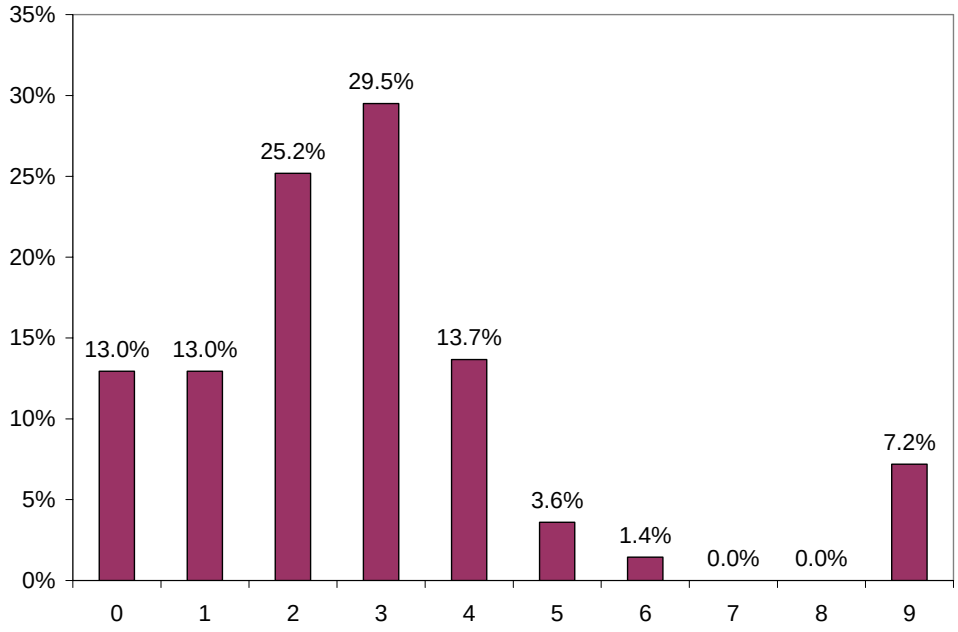
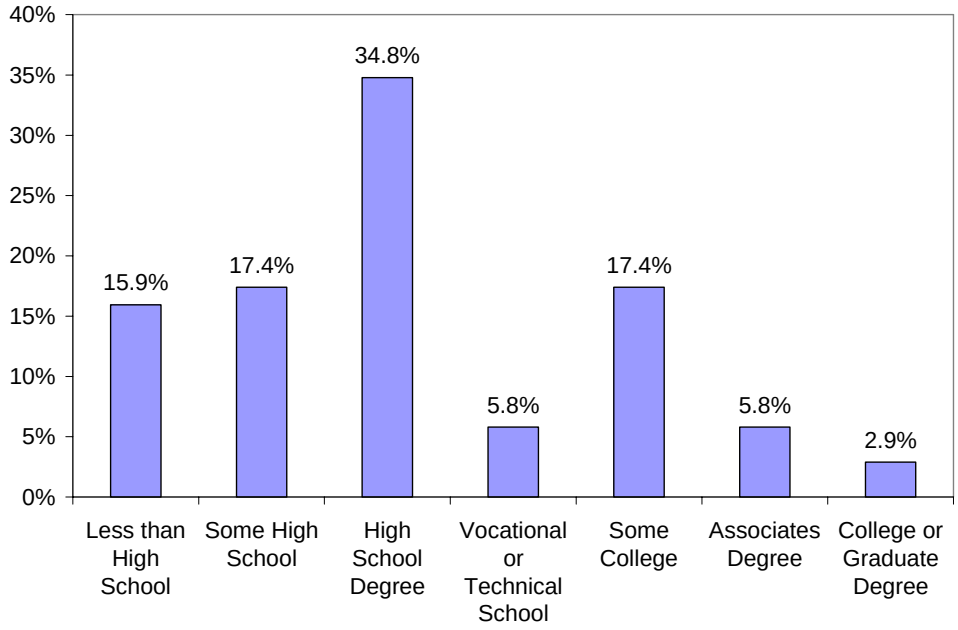


Figure 5: Number of Children



In keeping with the findings in national surveys of drivers, the mode of educational attainment among the port drivers was a high school diploma (Figure 6). Over one-third of drivers reported their terminal level of education was a high school diploma, 15.9 percent stopped their education before high school, 17.4 percent had some high school education (but no diploma), 5.8 percent hold a vocational or technical degree, 5.8 percent hold an Associate's degree, 17.4 percent report attending some college, and 2.9 percent hold a college or post baccalaureate degree.

Figure 6: Educational Attainment



Drivers were asked about their years of experience as a driver as well as how long they had worked with their current firm (Table 5). The mean number of years working as a driver was 8.45, close to the median of 8 years. Ten percent of the sample had been working as drivers 1.5 years or less and ten percent had worked as drivers 18 years or more. Time spent with the current firm is relatively low, as one would expect for a driving force which is primarily composed of owner operators who will typically switch among firms based upon pay. The mean years with the current firm is 3.47, significantly higher than the median of 2 years. One-quarter of the sample had been working with their current firm for a year or less.

Table 5: Experience and Tenure

Years Worked As a Truck Driver		
	Mean	8.45
	10th percentile	1.5
	25th percentile	3
	50th percentile	8
	75th percentile	13
	90th percentile	18
Years Worked With the Current Firm		
	Mean	3.47
	10th percentile	0.5
	25th percentile	1
	50th percentile	2
	75th percentile	4
	90th percentile	8.5

The Use of Owner Operators

An overwhelming number of drivers in the sample self-classify as owner operators. The question is why this percentage would be so much greater than the percentage of owner operators for over-the-road drivers (25 percent according to the Sloan Trucking Industry Program Survey of Drivers) or among the total population of truck drivers (10 percent according to the Current Population Survey). The answer to this question must lie in the interaction of supply and demand in this market.

On the demand side, one might question why firms would prefer to employ owner operators to employee drivers in port drayage. This choice has its roots in the more general "make or buy" decision made by firms. Firms are more likely to "make" (produce in house) services where there are possibilities of hold-up. Clearly in port drayage there is the potential for drivers to "hold up" firms by refusing to take loads (a

problem which is also cited generally in the literature on owner operators (Baker and Hubbard 2005)). There is some recent anecdotal evidence that port drayage companies are having problems retaining owner operators. Like other forms of trucking (LTL, for example), firms face potentially high costs of failing to pick-up and deliver freight on time.

Though there is potential for hold-up, why do most firms decide not to bring any trucking services in-house? Firms often "buy" services that they would have difficulty monitoring in-house. Port drayage firms could potentially monitor drivers through satellite-based-systems or other GPS technology, however, this technology tends to be costly. By contracting with owner operators and paying them by the trip, drivers have the incentive to pick up and deliver loads as quickly as possible in order to maximize their income. Thus, "buying" services with appropriate contracting (eg. pay per load) aligns the interests of firms and drivers without the firms paying monitoring costs.

Contracting with owner operators also reduces the firms' up-front capital costs. Firms do pay for the cost of capital – obviously drivers need to be paid enough to cover the cost of their trucks – however, they are paying for the cost of capital per load, not making an initial investment in a fleet. Firms are also somewhat protected from variability in insurance and fuel costs. Owner operators must be paid an amount that will cover their costs, however, due to information asymmetries and lack of market power among drivers, there might be a lag between the onset of increased cost of insurance and fuel and the time where firms incorporate these increased costs into the rates charged to shippers (and the amount paid to drivers). There is also the possibility that driver's mis-price their services due to lack of information (Peoples and Peteraf 1995).

There is some concern in the industry that owner operators are in fact employees who happen to own their own trucks (Hamelin 1999). Aside from the cost-smoothing reasons that firms might prefer owner operators, firms also avoid paying for benefits and never have to face collective bargaining problems with owner operators. The self-employed are not allowed to form a union under current anti-trust laws, though the Teamsters currently have a focused campaign to attempt to organize port drivers.

Obviously considering only the demand-side of the market for owner operators overlooks the fact that some drivers have a preference to be owner-operators. Several studies find that personal characteristics influence an individual's decision to become and owner operator rather than an employee driver (Lafontaine and Masten 2002, Peoples and Peteraf 1995). While these studies focus on factors such as age and marital status, the decision to become an owner operator at the Port of Long Beach most likely is a function of the fact that truck driver is a job that requires little skills and does not require mastery of English. In our samples, 88.6 percent of drivers were born outside of the U.S.

The supply-side decision in this case, might well be the fact that port drayage provides jobs that allow the driver to attain a certain level of income, with little requirements with respect to education and language skills. The mean net income (income after deducting for truck-related expenses) of the sample was$29,903, with a median income of $25,000. While this does not appear to be high income, one-third of the sample had less than a high school diploma and another 34.8 percent had a high-school diploma as their terminal level of education.

These arguments aside, there appears to be little reason that a recent immigrant could not find work as an employee driver at a local firm. Why choose to work as an

owner operator in port drayage? An explanation may be that they prefer the role of owner operator since it implies that they are business owners. The choice of port drayage may come as the result of a person's social network – they see a relative or neighbor driving truck and decide to pursue that route as well.

A Human Capital Model of Owner Operator Earnings at the Port of Long Beach

While descriptive statistics provide valuable information on the pay of this workforce, regression analysis permits examination of the factors that influence pay. Typically, human capital econometric models incorporate controls for demographics as well as firm characteristics. Given the relatively small sample size, we assume a parsimonious model of human capital. The dependent variable is driver's annual net income (income that has been adjusted for truck-related expenses). The explanatory variables include experience (years working as a driver), tenure (months leased with the current firm), and education (dummy variables are included for high school, some college, vocational or associate's degree, and college degree – the reference group are drivers who have not received a high school diploma).

Controls are also included for race (dummy variables for black and Asian, with white as the reference group) and ethnicity (a dummy variable for Hispanic). Finally, a set of dummy variables are included for firm size. Typically in the literature, there is a pay differential based upon firm size. Dummy variables are included for firms with between 25 and 99 drivers (59.7 percent of the sample), 100-249 drivers (10.1 percent of the sample), and 250 or more drivers (4.3 percent of the sample), with very small firms (less than 25 drivers) as the reference group.

Though typically there is a positive relationship between earnings and both experience and tenure, there is reason to believe that this relationship will not hold for the drivers in our sample. Belman and Monaco (2001) find no significant relationship between tenure and annual income for over-the-road drivers. Much like over-the-road drivers, port drivers in the sample have relatively low levels of tenure (mean tenure of 2 years and mean experience of 8.5 years) and there is little reason to believe that firms would reward drivers for firm attachment when labor is easily substituted – there are few firm-specific skills in port drayage.

Though studies of over-the-road drivers and studies of drivers nationally do find a positive relationship between experience and earnings, this positive relationship may not hold for port drayage. It is more likely that drivers would move out of port drayage with more experience and into sectors that feature better pay (such as local pick up and delivery and long haul). Similarly, though generally there tends to be a positive relationship between education and earnings, there is little evidence that a driver's productivity is positively related to education.

We would expect the variables for race to be negative (since minorities are typically paid less than whites). Only 3 percent of the sample is Black and 4.5 percent of the sample is Asian or Asian American. The black-white wage differentials tend to be much lower in trucking than other occupations, however, undoubtedly due to less discrimination present in low-skill low-paying occupations.

Finally, there is reason to believe that wages may be correlated with firm size (Belman and Groshen 1998). Workers at larger firms typically receive higher pay either due to efficiency wages, compensating differentials, or productivity differences. This last

factor seems the most likely in port drayage – if larger drayage firms are more efficient their drivers could potentially complete more trips per day, increasing their total pay over the course of the year.

Table 6: Wage Estimation

Variable	Coefficient	t-statistic
Experience	73.053	0.34
Tenure	59.429	0.12
High School Diploma	-1825.94	-0.55
Some College	391.489	0.10
Vocational/ Associate's Degree	3586.461	0.79
College	2978.614	0.30
Firm size 25-99	-6221.417	-1.90
Firm size 100-249	-9903.477	-2.11
Firm size 250 plus	-1839.228	-0.27
Black	-9140.689	-0.77
Asian	-1956.887	-0.16
Hispanic	-11128.83	-2.07
Constant	41928.87	6.24
n	123	
R-squared	0.15	

The estimation results are presented in Table 6. The lack of significance of experience, tenure, and education support the hypotheses made a priori. Though it may seem irrelevant to include these variables in the model, their lack of significance is important in understanding the nature of skills and pay in this occupation. The coefficients on black and Asian are also insignificant, indicating no substantial race – based wage gaps in this occupation. The coefficient on Hispanic is negative and

significant, however, indicating that these drivers earn approximately $11,128 less per year than non-Hispanics. This result may represent a relationship between language skills and annual income.

Finally, two of the firm size variables have negative and significant coefficients. Drivers who haul for firms that contract with 25-99 drivers earn $6221 less over the course of the year than drivers at small (less than 25 drivers) firms. The wage gap is larger for drivers at firms with 100-249 drivers – these drivers earn $9903 less than drivers at small firms. The coefficient on very large (more than 250 drivers) firms is not statistically different than zero. This pay differential may reflect the nature of the drivers' relationships with their firms. It may be the case that drivers at very small firms are used more intensively than drivers at medium sized firms (thus increasing their annual net income) since these drivers may have a more personal connection to the firm they are contracting with. At very large firms, drivers may earn high levels of net income if these firms are run more efficiently.

A Model of Waiting Time

A key issue facing drivers in port operations is the amount of time they spend waiting at the Port. Since the vast majority of the drivers are paid by the trip, their income is lowered by long lines. The increased volume of trade coming into the San Pedro ports has brought with it increased congestion and longer lines at terminals. In order to address health concerns related to truck idling, AB 2650 was passed in the state of California which fined terminal operators if they had trucks idling outside the gate for more than 30 minutes. Though this law brought considerable attention to the problems of

truck congestion at the Ports, the fact that terminals were not fined if they maintained appointment systems or extended gate hours has meant as well as the lack of manpower to monitor truck idling has led to criticism that the law has had little effect on the amount of time trucks spend waiting at the ports.

On average, port drivers report 48 percent of their trip time is spent waiting to get in and out of the port. A model of the determinants of waiting time is developed. As in the case of the wage model, the econometric model is fairly parsimoniously specified, with a focus on the key correlates of waiting time. The dependent variable is the ratio of waiting time to total time of the last trip. The explanatory variables are tenure, experience, race, and ethnicity, and firm deadlines.

Experience and tenure both might be negatively related to waiting time. With experience a driver may become more adept at working with firms who regularly send their drivers to more efficient terminals. The same logic might apply to tenure. With a longer relationship between driver and firm, the driver might receive preferential loads as a way of attaching the driver to the firm. Race and ethnicity are included to examine whether there are unexplained differences in waiting time based on these characteristics. The Hispanic variable was significant in the wage equation, suggesting that the lower wages might be either due to discrimination or wage skills. To test for this in the waiting time equation, rather than including a dummy variable for Hispanic, a variable is included which takes a value of 1 if the driver was born in the U.S. (a proxy for language skills).

In the wage equation, it was hypothesized that larger firms might operate more efficiently. If this efficiency is caused by using driver's time more effectively then the

coefficient should be negative for larger firms. A dummy variable is also included which takes a value of one if the driver indicates that they are under strict deadlines for pickup and delivery (74.8 percent of the sample). Firms under strict deadlines might be more likely to dispatch drivers at off-peak times or to schedule an appointment with the terminal, which should reduce waiting time.

Table 7 Waiting Time Estimation

Variable	Coefficient	t-statistic
Experience	-0.0060	-0.25
Tenure	-0.0012	-2.36
Firm size 25-99	-0.0400	-1.02
Firm size 100-249	0.0011	0.02
Firm size 250 plus	-0.1511	-2.61
Black	-0.2309	-1.64
Asian	-0.0849	-0.77
Born in U.S.	-0.1356	-2.73
U.S. Citizen	0.0366	1.09
Constant	0.5889	13.67
n	144	
R-squared	0.20	

The results of the estimation are presented in Table 7. Though tenure is not statistically significant, there is a negative relationship between experience and waiting time, providing support for the hypothesis that drivers who have been in the occupation for a long period find ways to circumvent inefficiencies. Drivers at the largest firms (250 or more drivers) have less waiting time, in accordance with the hypothesis that these firms may use labor more efficiently. Finally, there is evidence that those born in the

U.S. have less waiting time that those born outside of the U.S. This suggests that the lower wages earned by Hispanics may not be due to discrimination, but somewhat attributable to language skills.

Chassis and Road Safety

The issue of chassis safety is topical in intermodal drayage (Swan 2004). Though chassis are not owned by the drivers or drayage companies, in most states the drivers are held responsible for the chassis they operate on the roads. California is the most recent state (in 2002) to enact a chassis law that puts the responsibility for chassis safety on the chassis owner. As drivers have little time to inspect equipment and economic incentive to get in and out of the port complex quickly, it is not unusual for drivers to take unsafe chassis on the road. Half of the drivers in the sample stated that they had been offered an unsafe chassis in the 30 days prior to the survey.

Drivers in the survey were asked what they had done the most recent time they had been offered an unsafe chassis. Twenty-two percent reported that they had taken the chassis on the road. A logit model is developed to assess the correlates of taking an unsafe chassis on the road. This model is used since the dependent variable is dichotomous, taking a value of one if the driver took an unsafe chassis on the road and zero otherwise. The specification follows that of previous models. Controls are included for race and ethnicity, tenure and experience and firm size. Daily pay, truck ownership, and a dummy variable for a moving violation are also included as explanatory variables.

It is not clear, a priori, whether race or ethnicity would increase or decrease the likelihood of taking an unsafe chassis on the road. The signs of tenure and experience are

also not clear. It could be the case that drivers with more experience are more risk averse and thus would be reluctant to accept an unsafe chassis. It might also be that drivers with more experience feel that their skills could compensate for an unsafe chassis, thereby increasing the likelihood of acceptance.

A measure of daily pay is included to capture whether those who earn more are more likely to accept unroadable chassis. A dummy variable is included which takes a value of one if the driver owns his/her truck. (81.6 percent of the sample). The sign of this coefficient is also indeterminate a priori. Owners of trucks might be more risk averse, decreasing the likelihood of accepting an unsafe chassis, however, they also might be under more economic pressure, thereby increasing the likelihood of accepting an unsafe chassis. Finally, a dummy variable is included which takes a value of one if the driver had received a moving violation in the last 12 months (51.5 percent of the sample). The coefficient on this variable is expected to be positive. Speeding is a proxy for risk preference among drivers. It is also likely the case that drivers who admit to receiving a moving violation might also be more comfortable admitting that they took an unsafe chassis on the road.

As the model is a non-linear logit estimation (a probit estimation exhibited similar results), the coefficients do not represent marginal effects. Rather the focus is on whether the coefficient is positive or negative.

Table 8 Chassis Logit

Variable	Coefficient	z-statistic
Experience	0.0381	0.92
Tenure	-0.0098	-0.12
Firm size 25-99	0.3323	0.45

Firm size 100-249	1.7134	1.97
Firm size 250 plus	0.9812	0.71
Hispanic	0.3686	0.28
Pay Per Day	-0.0012	-0.50
Own Truck	1.6914	1.51
Moving Violation	1.1565	1.87
constant	-5.0218	-2.71
n	145	
Pseudo R-squared	0.14	

Most coefficients are not significant – it appears that race, ethnicity, experience, and tenure do not affect the probability of taking an unsafe chassis on the road (see Table 8). Pay per day is insignificant. Though it is clearly possible that this variable is endogenous, using a two stage approach does not alter the results.

Drivers who report receiving a moving violation are also more likely to report taking an unsafe chassis on the road. Again, this is undoubtedly a combination of risk-taking behavior and the willingness to report such behavior in a survey. Finally, drivers at firms with 100-249 drivers are more likely to take an unsafe chassis on the road than are drivers at small firms.

Summary

Drivers at the Ports of Los Angeles and Long Beach are critical to goods movement within Southern California and provide a key link to trade between the region and the rest of the country. The driver survey conducted at the Port of Long Beach

provides insight into the wages and working conditions of these drivers, most of whom are owner-operators and many of whom are not native to the United States.
These self-employed drivers bear the risk of fluctuations in diesel prices, insurance costs, and capital expenditure, allowing drayage companies to operate with significantly lower fixed costs. The drivers work long hours (on average 11.2 hours per day) and spend 50-60 percent of their time involved in non-driving work (such as waiting at the ports). Their pay, while comparable to national figures on workers with a high school diploma at $29,903, involves working 33 percent more hours than a typical full-time worker. It is also notable that these drivers are paid substantially lower than the national average for owner operators and employees.

The pay and work of these drivers raises questions about the way in which this labor force should be utilized to improve port efficiency. Currently delays at the port cause problems for shippers and truckers, while the terminal operators and longshoremen are insulated financially due to high volumes of trade. Given the inability of drivers to collectively bargain, and the apparent inability of port drayage companies to contract for higher rates with ocean carriers, there is little hope that the inefficient use of drivers' time will be remedied.

FIRM LEVEL SURVEY

To gain a broader understanding of the firms engaged in port drayage, a firm-level survey was administered. A database of firms was generated using data that the Teamsters had gathered from observing the names on the sides of trucks at the Ports. The database contained the firm name as well as the address and phone number. Using this as

a starting point, the Safersys database, available from the US DoT, was used to determine the number of power units for each firm in order to divide the sample into small, medium and large firms. A random sample was generated within these three strati and firms were sent paper surveys. Phone calls and faxes were used to follow up to the mailing and increase the response rate. The response rate was approximately 33%. Surveys were sent to 98 firms and 32 completed surveys were received.

The survey instrument (see Appendix B) contained questions on firm dispatching, use of technology, operations, and employment. Only 13 percent of firms reported employing drivers – the remaining 87 percent exclusively contracted with owner operators exclusively to haul freight. The mean firm contracted with 45 owner operators (the median is 79). The smallest 10 percent of firms used 3 or fewer owner operators and the largest 10 percent used 200 or more owner operators.

Firms were asked how many customers they served on a given day (Figure 7) and how many container moves were performed on a given day (Figure 8). Nearly half of the firms serve 20 or more customers on a typical day, with a median of approximately 80 container moves.

Figure 7: Number of Customers Served in a Typical Day

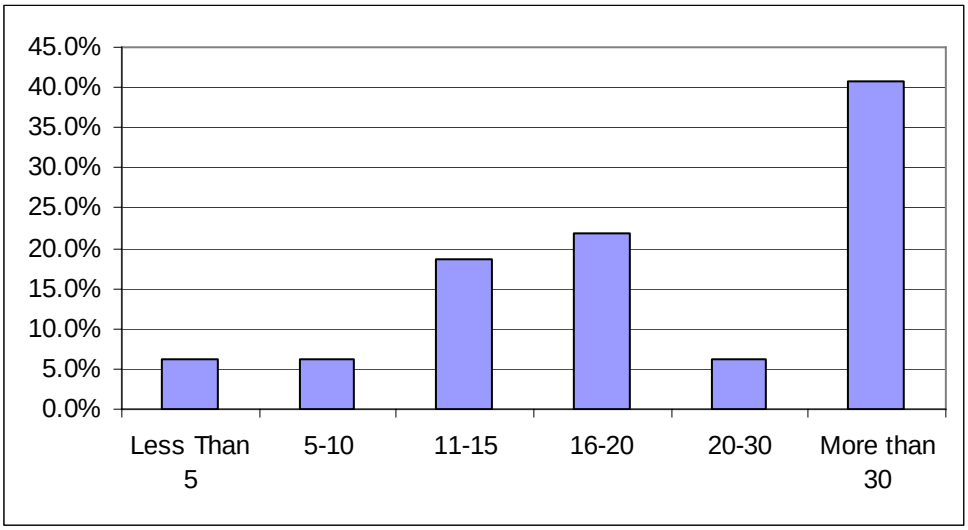
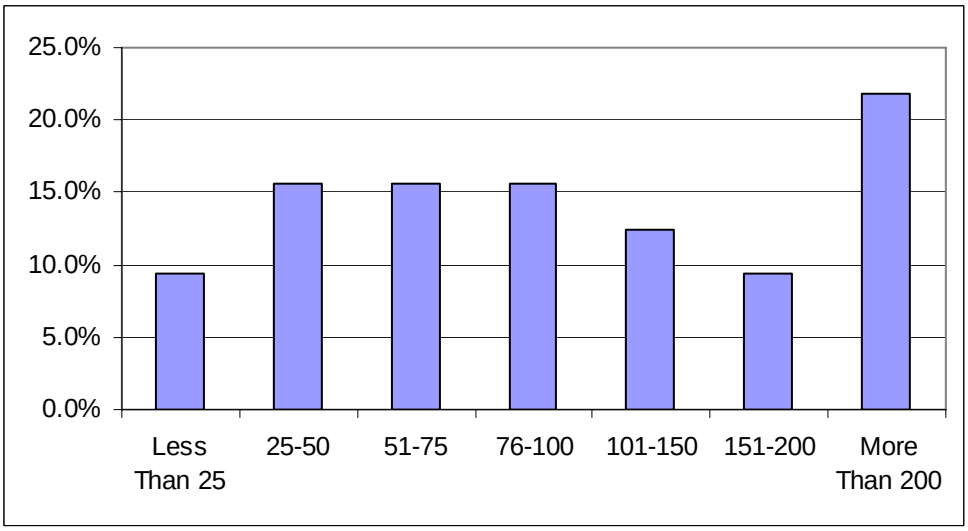


Figure 8: Number of Container Moves in a Typical Day

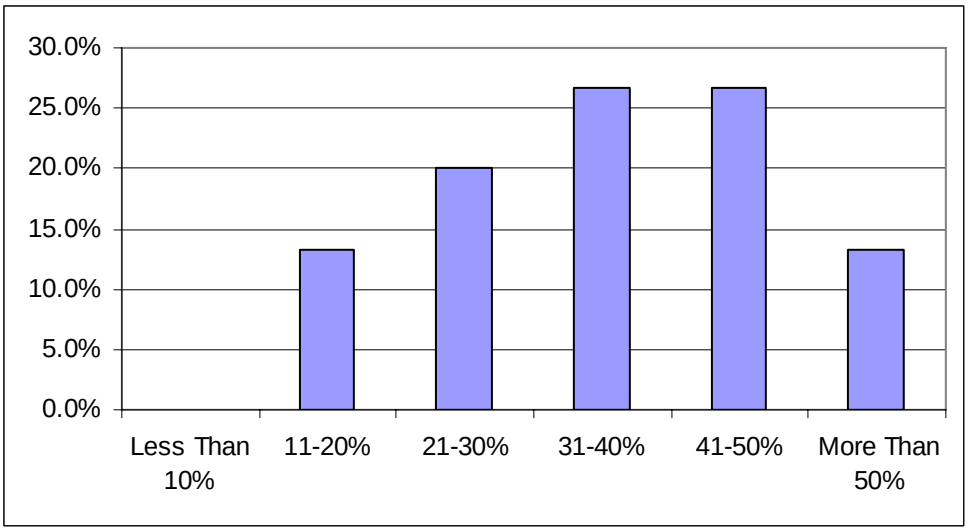


Additionally, firms were asked the average miles a driver would drive in one day, the percentage of those miles that are loaded miles, the hours it would take the driver to complete the day's driving, and the percent of the hours that are spent waiting. The bulk of firms (84.4 percent) report average daily mileage between 61 and 200 miles, 6.3 percent report an average of less than 60 miles per day and 9.4 percent of firms report

their drivers averaging more than 200 miles per day. According to the firms, drivers work an average of 8.9 hours per day, with a median of 9.5 hours. This is a lower number than drivers themselves report.

The results of the driver's survey and the firm survey provide similar evidence on the percent of time spent waiting, with a mean of approximately 40 percent waiting time reported in the firm survey (Figure 9).

Figure 9: Percent of Truck Time Spent Waiting in a Typical Day



Technology is not widespread in this segment of the trucking industry, perhaps not surprising given the lack of company trucks and the relatively low margins under which these firms and drivers operate. Less than 40 percent (39.3) of firms report using decision support software for developing routes and schedules. Though nearly all firms (93.3 percent) report using the appointment system regularly, many mentioned that they only used the system in the earlier portion of the day, with several indicating that since they could not predict what time their moves would be in the afternoon, they were unable to take advantage of the appointment system. Clearly, there exists some potential for

increased efficiencies in the system if these firms planned daily trips, perhaps through the use of software for routing and scheduling.

The vast majority of firms (90.6 percent) report being on strict deadlines for pickup and delivery of containers. Nearly three-quarters (74.2 percent) report being penalized for missing deadlines, however, only one firm (3 percent) reported receiving incentives for early delivery of containers to the customer. The type of deadlines faced by firms differ depending on whether the container is for export (Figure 10) or import (Figure 11).

Figure 10: Export Container Deadlines

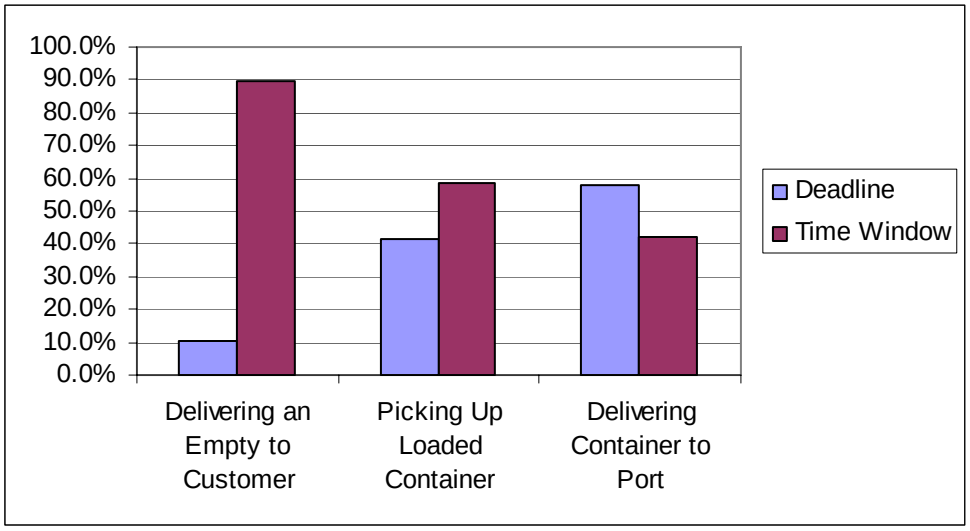
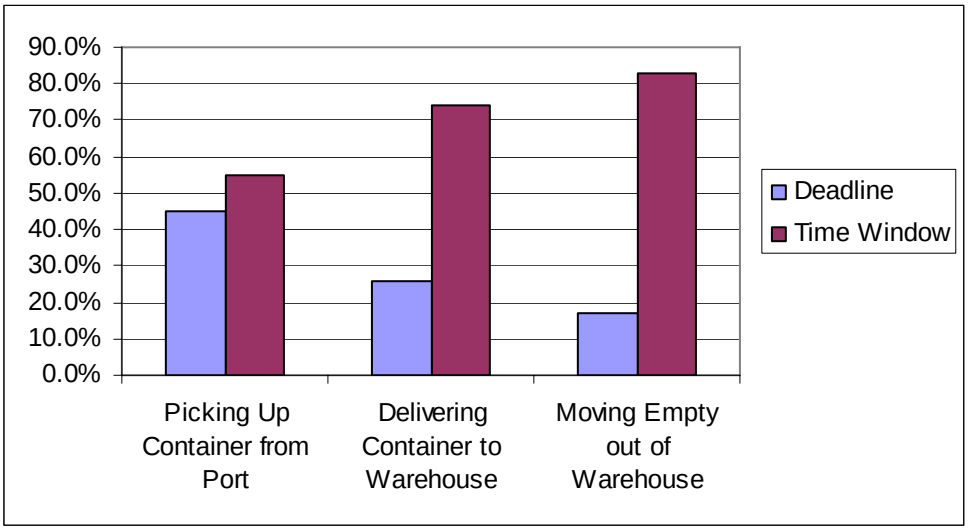


Figure 11: Import Container Deadlines



Firms are more likely to be on a strict deadline for delivering an export container to the port and more likely to be on a time window for picking up an import container from the port. Firms are likely to have time windows for delivering empty containers to a customer and moving empty containers out of a warehouse.

Given the deadlines faced by firms, it is surprising that so few of the firms use software, particularly to aid in the scheduling of trucks. Seventy percent of firms report that they had a complete list of the day's tasks available to them at the beginning of the day, however, only 37.5 percent give the driver a complete list of tasks to be performed at the beginning of the day. It is much more common for the drivers to be assigned their next task only after the prior task was completed (59.4 percent).

TURN TIMES AT THE PORTS

In addition to gathering general data on trucking firms, a final goal of the study was to examine waiting time in more detail. Ideally, data would be gathered on truck turn

times with enough detail to isolate the amount of waiting time spent inside and outside of terminal facilities. Firms that had responded to the firm-level survey were approached in order to determine the detail of data they collected on truck trip times. There were no firms able to give us the level of detail we were seeking.

Firms were asked about the level of detail that they had on truck turn times. No firms had records that documented the time lapsed between a truck's arrival at the port and its departure. The only data widely available was based on information provided by the terminals. Some terminals provide tickets to drivers when they arrive at the gate and when they leave the gate. In addition, some terminals provide drayage companies detailed monthly ingate and outgate reports (essentially the same information as on the tickets, but in a more convenient layout). We obtained these records from three medium sized port drayage companies.

Data on ingate and outgate times was obtained for four periods: Summer 2002, Fall/Winter 2002, Summer 2003, and Fall/Winter 2003. Though this data does not provide information on how long each truck trip took, it will provide us with descriptive statistics on waiting time inside the gates. It is important to note that there was no attempt to gather data from a representative cross-section of firms, nor is it likely the case that the data represents average turn times for all terminals.

There were two sources of turn time data. The first was the ingate and outgate reports provided to drayage firms by the terminals. One of the drayage companies provided us with this data. Not all terminals provide this data to the drayage companies. The second source of data is the billing records for the drayage companies. Typically the ingate and outgate tickets were stapled to the billing record. If only one of the tickets (or

none of the tickets) were attached, then it was not possible to calculate the amount of time inside the gates. There were some terminals that did not provide any of this information. This skews the results, thus, the information presented should be used for purely descriptive purposes and not to make generalizations about waiting times at the ports. While this is somewhat limiting, it provides foundation for future research which would gather more detailed data, assuming drayage companies upgrade their technology and record-keeping.

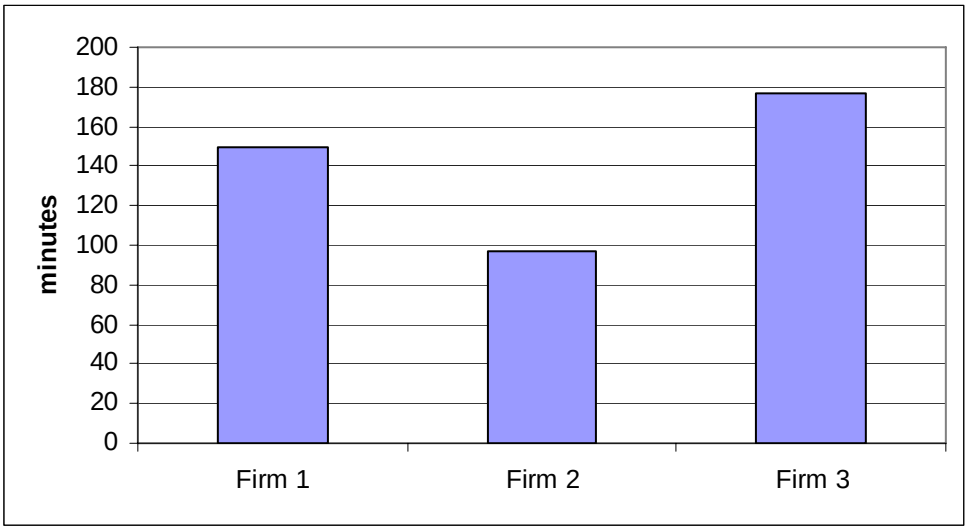
Turn time data was gathered for over 2000 truck trips. The information included the drayage company, terminal, date, time in and time out. The last two pieces of information were used to measure the number of minutes spent inside the terminal, which will be referred to as the truck's "turn time." The analysis was restricted to trucks that were inside the terminal facilities for more than five minutes. The amount of time that trucks spend inside terminal gates varies widely. The mean number of minutes is 72 (almost 1.25 hours), with a median of 44 minutes. This suggests that many trucks do get in and out of the terminal facilities in an hour, but clearly there are a large number of trips that take considerably longer (making the mean substantially larger than the median). One-quarter of turn times were less than 27 minutes and 10 percent were less than 20 minutes. On the upper end of the distribution, the 75^{th} percentile was 90 minutes and the 90^{th} percentile was 180 minutes, indicating that 10 percent of trucks spent three hours or more inside the terminal for just one trip.

This data, however, is largely driven by very efficient truck moves involving one of the trucking companies and one terminal. If these data are excluded from the analysis,

the average turn time increases to 126.22 minutes, with a median of 106 minutes. The lower 10 percent and upper 10 percent are 35 minutes and 180 minutes, respectively.

The mean turn times differ significantly by firm (Figure 12), indicating that some firms use their drivers more efficiently than others. This likely is the results of contracting primarily with terminals that are more efficient.

Figure 12: Mean Turn Time by Firm

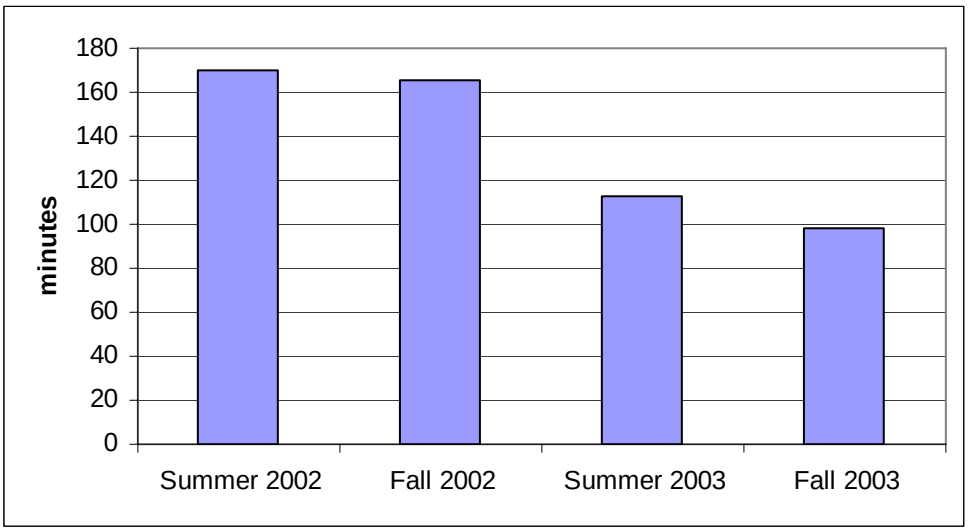


Firm 2 has a mean turn time of 96.6 minutes, compared to 149.5 minutes for Firm 1 and 177.1 minutes for Firm 3 (all of these differences are statistically significant at the one percent level). These statistics do not reflect a key portion of Firm 2's truck trips which were even shorter and served one specific terminal. These findings will be addressed in more detail later in the report.

Also of interest is whether the amount of time spent in terminal facilities has changed substantially over time. Recall that the passage of AB2650 was designed to reduce truck idling at the Ports, however, many skeptics propose that the waiting time of trucks simply moved inside of the terminal gates. While a decrease in the mean turn time

over the period in question would not provide concrete evidence that AB2650 decreased truck times at the port (other causes could be improved efficiency at the terminals due to capital and labor improvements), one would assume that an increase in mean turn times would provide some modest evidence that wait times had simply increased inside of terminal facilities.

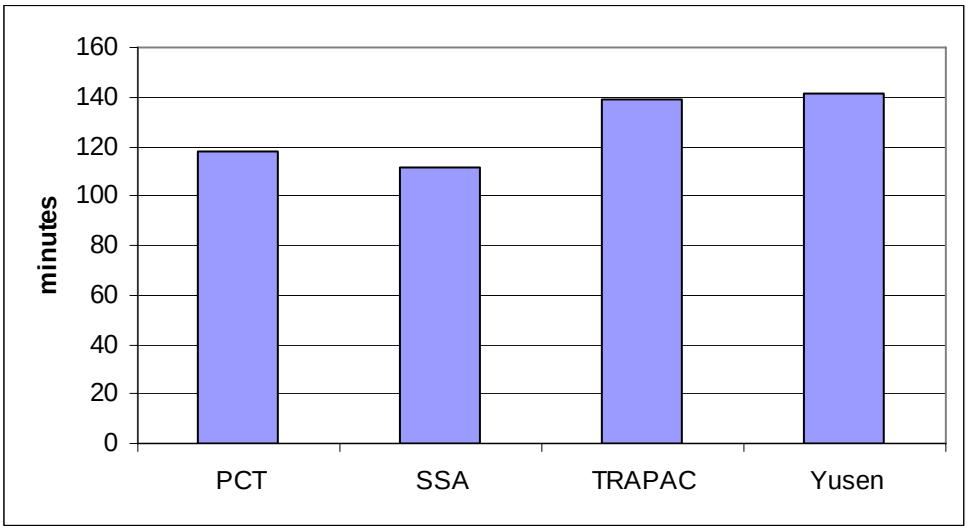
Figure 13: Mean Turn Time by Period



It is clear from Figure 13 that there has been a substantial decrease in turn times over the period in question. In Summer 2002, the mean wait time was 170.3 minutes. There was a slight decrease to 165.7 minutes in Fall/Winter 2002 (not a statistically significant decrease, p-value=0.369). By Summer 2003, however, the mean turn time decreased to 113.1 minutes (a significant decrease at the one percent level), and decreased again to 97.9 minutes in Fall/Winter 2003 (a significant decrease, p-value=0.03). While this decrease in turn time could be due to many factors, it shows an improvement in terminal throughput in terms of getting trucks (and containers) out of the terminal.

Which terminals have the lowest turn times? We restrict the analysis to terminals for which we have data on more than 50 truck moves (Figure 14).

Figure 14: Mean Turn Time by Terminal



The lowest mean turn time is reported by SSA with a mean of 111.3, which is lower, but not significantly so (p-value=0.2311) than PCT, with a mean of 117.6. TRAPAC and Yusen have longer mean turn times, 138.8 and 141.6, respectively. These are both significantly higher than SSA and PCT at the 5 percent level, however, the means are not significantly different from one another (p-value=0.4317).

Perhaps most interesting in this data set is the relationship between Firm 2 and an unnamed terminal, which results in uncommonly low turn times. The mean turn time is 38.5 minutes, with a median of 31 minutes. At the 75th percentile, trucks are in the terminal facilities for 47 minutes, and only ten percent of the sample was in the terminal for more than 71 minutes. The owner of the drayage company stated that the firm had a long term relationship with this terminal, generates most of their truck trips with this terminal, and tries to use early and late hour moves to improve efficiency. While

anecdotal, this does suggest that there is a possibility to improve truck flows at the port by focusing on cooperation between drayage companies and terminals. It also merits mention that this firm was the most advanced in terms of technology and electronic record-keeping.

CONCLUSIONS

We examine the characteristics of the port drayage industry, relying on original data sources. A survey of port drivers depicts this labor force as consisting of relatively low-educated Hispanic immigrants. Unlike other occupations (or other segments of trucking), drivers in port drayage receive no returns to additional years of education, tenure with the firm, or other measures of human capital. Though these drivers earn a reasonable annual income, this is the results of 60-hour work weeks where drivers typically spend 50 percent of their work day waiting to pick up or deliver loads.

Port drayage companies were surveyed on their operations, dispatching, and use of technology. Unlike other segments of the trucking industry which rely on routing and scheduling software, port drayage firms report low levels of technology. They confirm the driver study findings that drivers spend a significant portion of their workday waiting at the ports. Though firms indicate that they utilize the appointment systems at available terminals, most do not use the system consistently. Finally, though truck turn time data provides some evidence that time spent inside terminal facilities has decreased on average over the last two years, the mean time inside the gates is still high (an average of 80 minutes).

The data sources all reveal potential sources of improvements in truck productivity. Consistent use of appointment times at the ports should decrease driver's

waiting time, allowing them to increase individual productivity. There is also potential to improve firm efficiency by using software for dispatching and routing, perhaps better coordinating drivers' trips to the ports. The turn time data provides initial evidence that trucking companies who establish long-term relationships with specific shippers and terminals can generate a significant reduction in turn times, increasing driver productivity. This is anecdotal evidence that merits additional data collection and analysis.

REFERENCES

Baker, G.P. and T.N. Hubbard (2005), "Contractibility and Asset Ownership: On Board Computers and Governance in U.S. Trucking," forthcoming, Quarterly Journal of Economics.

Belman, D.L., F. Lafontaine, F. and K. Monaco (2004) "Truck Drivers in the Age of Information: Transformation without Gain." In DL. Belman and C.C. White. Eds, *Trucking in the Age of Information*, forthcoming, Sage Publications.

Belman, D.L. and K.A. Monaco, (2001) "The Effects of Deregulation, De-unionization, Technology, and Human Capital on the Work and Work Lives of Truck Drivers," *Industrial and Labor Relations Review*, 54, 502-24.

Belman, D.L. and E. Groshen (1998) "Is Small Beautiful for Employees?" *Small Comfort: Small Business, Job Creation and Wages*. Economic Policy Institute, 1-60.

Hamelin, P. (1999), "Social Aspects of Road Transport Drivers' Working Hours," *Social Aspects of Road Transport*, Paris and Washington, D.C.: Organisation for Economic Co- operation and Development, 67-88.

Lafontaine, F. and S. E. Masten (2002), "Contracting in the Absence of Specific Investments and Moral Hazard: Understanding Carrier-Driver Relations in US Trucking," NBER working paper 8859.

Peoples, J. and M. Peteraf (1995) "Deregulation and the Competitive Fringe: Owner Operators in the Trucking Industry," *Journal of Regulatory Economics* 7, 27-42.

Swan, Peter F. "A Study of the Economic Impacts and the Need for Proposed Changes to Intermodal Container Chassis Inspection Rules." Report prepared for IBT, ATA, ILA, ILWU, 2004.

Appendix A: Driver Survey, English Version

1 Do you primarily do:

a. ___Landbridge (hauls to ICTF or railheads)
b. ___Delivery to the Inland Empire
c. ___Local Delivery
d. ___Over-the-Road (long haul)

2 About how many miles did you drive your truck last year?

	MILES

3 How many years have you worked as a truck driver?

	YEARS

4 To the nearest thousand dollars, how much did you earn last year from your work as a truck driver last year?

	DOLLARS

5 Are you an employee of a trucking firm, a subhauler (someone who works for a driver who owns his own fleet), or are you an independent contractor (owner operator)?

1. EMPLOYEE	2. SUB-HAULER	3. OWNER-OPERATOR

6 Is this a year round, full-time, permanent job?

YES	NO

7 How long have you worked with your current firm? _____

8 How many drivers work for your company ?

Less than 25	25-99	100-249	250-499	500-999	1000 or

9 How are you being paid for your current trip? …

_____ per _____

10 How many hours do you work in a typical day (including waiting and other nondriving time)?

	HOURS

11 How many turns do you make in a typical day?

	TRIPS

We would like to understand more about how your firm dispatches drivers.

12 Are you given a list of tasks to be performed each day at the beginning of the day?

YES	NO

13 How does your firm do its daily dispatching?

____ You are informed of the next task at the completion of the previous task

____You are informed of the schedule in intervals

13a. What are those intervals? _____ hours (1, 2, 3, other)

We would like to understand the importance of time deadlines in the day-to-day operation of drayage trucks. The next few questions are based on this.

14 Do you encounter strict time deadlines for pick-up or delivery of containers?

YES	NO

15 Does your firm incur penalties for not meeting these deadlines?

YES	NO

16 Do you or your firm receive any incentives for early delivery of containers?

YES	NO

Now I am going to ask you a question about time spent working on your last trip (not the current one).

17 How many hours did your last trip take?

[ ] HOURS

18 How many of these hours were due to waiting in line, for example, waiting to pick up or deliver a container, waiting in line to get ID verified, waiting in line to get into the port?

[ ] HOURS

Now I am going to ask some questions about your last pay period.

19 How much was your last pay check?

[ ] dollars

20 How many days did you work during that pay period?

[ ] days

21 Do you have a pension or retirement plan?

YES	NO

22 Do you have health insurance?

YES	NO

23 Do you own or lease your truck?

OWN	LEASE	NEITHER

24 To the nearest thousand dollars, how much did you earn last year from your work as a truck driver net of truck expenses?

	DOLLARS

25 <u>In the last twelve months</u>, have you been cited for a moving violation while on duty?

YES	NO

26 In the last month have you been given a chassis that was not road worthy?

YES	NO

27 How did you respond the most recent time you received a chassis that was not roadable?

A. _____Waited for new chassis

B. _____Waited for repair to chassis

C. _____Took the chassis on the road

D. _____Other (please specify)_____

Please note: the following demographic questions are confidential and are only being used to learn about the characteristics of the group.

28 How old are you?

[ ] YEARS OLD

29 Are you Male or Female?

[MALE] [FEMALE]

30 Are you currently married, widowed, divorced, separated or have you never been married?

[MARRIED] [WIDOWED] [DIVORCED] [SEPARATED] [NEVER MARRIED]

31 How many children do you have?

[ ] DEPENDENT CHILDREN

32 Do you consider yourself white, African American, Asian-American, Native America or something else?

[WHITE] [AFRICAN AMERICAN] [ASIAN-AMERICAN]

[NATIVE AMERICAN] [OTHER]

33 Are you Hispanic?

[YES] [NO]

34 Were you born in the United States?

[YES] [NO]

35 Are you a US Citizen?

YES	NO

36 What is the highest grade of school or college that you completed?(

LESS THAN HIGH SCHOOL (8th GRADE OR LESS)	SOME COLLEGE (NO DEGREE)
SOME HIGH SCHOOL (9th - 12th GRADE)	ASSOCIATE DEGREE
HIGH SCHOOL DEGREE	COLLEGE OR GRADUATE DEGREE
VOCATIONAL OR TECHNICAL SCHOOL	

Appendix B: Firm Survey

D**ISPATCHING**

We would like to understand more about how your firm dispatches drivers.

1. Do you have the complete list of tasks to be performed each day at the beginning of the day?

   ❑ Yes ❑ No

2. How does your firm do its daily dispatching? (Please Check One)

   ❑ The drivers are given the list of tasks at the beginning of the day.
   ❑ The drivers are informed of the next task at the completion of the previous task.
   ❑ The drivers are informed of the schedule in intervals

   What are those intervals in hours?

   ❑ Less than 1 ❑ 3
   ❑ 1 ❑ More than 3
   ❑ 2

We would like to understand the importance of time deadlines in the day-to-day operation of drayage trucks

.

3. Do you encounter strict time deadlines for pick-up or delivery of containers?

   ❑ Yes ❑ No

4. What types of deadlines are encountered in your orders? (Please choose whether it is a deadline or a time window)

   <u>For export containers</u>

   Delivering an empty container to a customer
   ❑ Deadline ❑ Time Window

   Picking up loaded container
   ❑ Deadline ❑ Time Window

   Delivering container to the port
   ❑ Deadline ❑ Time Window

   Other, please specify

   <u>For import containers</u>

   Picking up container from the port
   ❑ Deadline ❑ Time Window

   Delivering the container at the customer's warehouse
   ❑ Deadline ❑ Time Window

   Moving empty container out of the warehouse
   ❑ Deadline ❑ Time Window

   Other, please specify

5. Does your firm incur penalties for not meeting these deadlines?

❑ Yes ❑ No

6. Do you receive any incentives for early delivery of containers?

❑ Yes ❑ No

TECHNOLOGY

7. Does your firm regularly utilize appointment times at the port for terminals that offer them?

❑ Yes ❑ No

If no, in your opinion what are the disadvantages of the appointment system?

8. Do you use decision support software for developing your routes/schedules?

❑ Yes ❑ No (If no, go to question 12)

9. Please specify the software name and the vendor distributing the software

_____

10. Does the software meet all your requirements in terms of modeling the constraints you face in practice?

❑ Yes ❑ No

11. If no, what are the practical problems that the software does not address?

OPERATIONS

Please give your daily averages for the following questions.

12. How many customers do you serve on a given day?

❑ Less than 5
❑ 5-10
❑ 11-15
❑ 16-20
❑ 20-30
❑ More than 30

13. How many container moves do you perform on a given day?

❑ Less than 25
❑ 25-50
❑ 51-75
❑ 76-100
❑ 101-150
❑ 151-200
❑ More than 200

14. What is your average fleet size?

- ❑ Less than 10
- ❑ 10-25
- ❑ 26-50
- ❑ 51-75
- ❑ 76-100
- ❑ 101-150
- ❑ More than 150

15. On average how many miles does a truck run in one day?
    - ❑ Less than 30
    - ❑ 31-60
    - ❑ 61-200
    - ❑ More than 200

16. What percentage are loaded miles?
    - ❑ 10%-25%
    - ❑ 26-50%
    - ❑ 51-75%
    - ❑ 76-100%

17. How many hours would it take a typical driver to drive those miles, including waiting times?

    _____ Hours (please round to the nearest quarter hour)

18. How many of these hours (in 17) are due to waiting? (This includes time such as time spent waiting in line to get into the port, time spent on loading, unloading, waiting for dispatch or to get into a dock, waiting for bills to be cut, waiting in line to get driver ID verified)
    - ❑ Less than 10%
    - ❑ 11-20%
    - ❑ 21-30%
    - ❑ 31-40%
    - ❑ 41-50%
    - ❑ More than 50%

EMPLOYMENT

Please give us the number of employees in each category.

Employee Drivers and Helpers – Hourly Basis _____

Employee Drivers and Helpers - Mileage Basis _____

Employee Drivers and Helpers – other basis _____

Owner Operators (1099 Drivers) _____

Cargo Handlers _____

Officer, Supervisors, Administrative and Clerical _____

Other Labor _____