ABSTRACT

Current Population Survey (CPS) data for the years 1973 to 1985 are used to examine the earnings of union and nonunion truck drivers during and after ICC regulation of the motor carrier industry. Hourly earnings for union drivers fell following deregulation, whereas wage changes among nonunion drivers closely mirrored economy-wide changes among nonunion operatives. Significant narrowing of the union-nonunion wage differential occurred primarily in the previously regulated for-hire sector of the trucking industry and in those regions with the most extensive nonunion operations. Despite some narrowing, the union premium remained sizable following deregulation. Significantly larger wage concessions would have been necessary to have prevented the marked decline in union trucking and Teamster membership that followed deregulation.

I. Introduction

Administrative deregulation during the late 1970s, coupled with subsequent passage of the Motor Carrier Act of 1980, effectively removed entry and rate restrictions from an industry long sheltered from
important forms of competition. Previous studies (e.g., Moore 1978) have found that organized labor achieved significant bargaining power in the trucking industry and captured a sizable share of the monopoly rents associated with regulation. Substantial deregulation of the trucking industry has encouraged rate competition and entry, particularly by nonunion firms, and significantly decreased union employment and bargaining power. Because deregulation occurred during a period of erratic macroeconomic performance, however, sufficient evidence to evaluate deregulation’s longer-run effects on the earnings of drivers only recently has become available.¹

In this paper, data from the May Current Population Survey (CPS) tapes for the years 1973 through 1985 are used to examine union coverage and hourly earnings of union and nonunion truck drivers before and after deregulation. The response of wages to deregulation are examined separately for truck drivers in the for-hire and private carrier sectors of the industry and across regions. In order to control for changes in economy-wide conditions, the wages of truck drivers are also compared with a control group of operatives outside of trucking. The regulatory and collective bargaining structure of the industry is summarized in Section II, while the effects of deregulation on employment and wages are analyzed in Section III. Section IV presents the data and modeling employed in subsequent empirical work. Empirical results and analysis are provided in Sections V and VI, with conclusions following in Section VII.

II. Regulation and Deregulation in the Trucking Industry

The Motor Carrier Act (MCA) of 1935 provided the Interstate Commerce Commission (ICC) with regulatory authority over motor freight carriage. Supported by the already regulated railroad industry and the newly created American Trucking Association, the ICC severely restrained entry and price competition in the industry. Federal regulation primarily covered for-hire common carriers engaged in intercity and interstate cartage. Private and local carriers, as well as carriers of exempt

¹. Rose (1987) provides a closely related analysis. Although earlier drafts of our papers differed significantly, the final versions are very similar. This study differs from Rose’s in that the wages of drivers in the private carrier as well as the for-hire sectors of the industry are analyzed in detail, regional differences in the effects of regulation are examined, an occupational control group rather than broader industry control groups is employed, and sample selection criteria and regression specifications differ slightly. Rose provides a fuller discussion of the National Master Freight Agreements (NMFAs) and an estimate of the aggregate loss in rents to the Teamsters due to deregulation.
commodities (e.g., unprocessed agricultural products), were largely exempt from direct federal regulation. While the regulated sector involved a distinct minority of carriers, their total operating revenues far exceeded the noncovered sector.

Regulated common carriers were required to operate under ICC authority that designated points of origin and destination, the routes over which freight must be carried (in the case of regular route carriers of general freight), and types of freight (in the case of irregular route carriers of special commodities). Regular route carriers typically operated through terminals where less-than-truckload cargoes were sorted into full-load lots for movements to customers or other terminals.

After "grandfathering" many carriers that existed prior to passage of the MCA of 1935, the ICC severely constrained issuance of new route certificates. As interpreted by the ICC, certificates of public convenience and necessity were issued only where routes were not previously being served and if entry would not economically damage existing carriers. In practice, the primary mechanism through which companies expanded or entered into new lines of service was through purchase of route certificates in the secondary market. The aggregate market value of these route certificates, which provides a rough measure of the monopoly returns to original certificate and capital owners from regulation, was reduced from 1.5 to 2 billion dollars in the 1972 dollars to close to zero by deregulation (Moore 1978, 1983).^2

Because the setting of detailed freight rates would have been extraordinarily complex, the ICC encouraged regulated carriers to establish rate bureaus through which they could engage in joint ratemaking. In 1948 Congress passed the Reed-Bullwinkle Act, which exempted these rate bureaus from the antitrust laws. By 1980, approximately ten major and 55 smaller rate bureaus were in operation. Thus, individual firm ratemaking in the regulated sectors of the market was severely constrained prior to deregulation.

Restrictions on entry and rate competition provided an opening for union gains in the trucking industry. The longtime goal of the International Brotherhood of Teamsters (IBT) was the signing of a national wage

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2. Frew (1981) provides a detailed analysis of the determinants of route certificate prices during 1971–77. Route prices exhibited a downward trend over the period, ceteris paribus, suggesting that deregulation was partially anticipated. Rose (1985) provides an events study in which changes in share prices of 32 publicly traded firms engaged in motor carrier operations are examined over the 1977–81 period. She finds large (and highly variable) losses in market value resulting from deregulation: an average 31 percent among general freight carriers and an average 15 percent among specialized commodity carriers. She concludes that regulatory rents were realized in part by owners in the form of higher firm profits, and in part dissipated through higher labor and service costs.
agreement that would remove labor costs from competition among firms. The goal’s attainment was facilitated by the nature of ICC ratesetting, which based rates on operating ratios, measuring the ratio of operating costs to revenues. Hence, increases in labor costs, which accounted for about 65 percent of total freight costs, could largely be passed through in rates. While individual trucking firms still had incentive to lower costs, Teamster control of major terminals and their effective use of secondary boycotts until the 1960s allowed the IBT to organize major segments of the industry. The Teamsters’ major strength was, and to a lesser extent remains, among regular route carriers of general freight in the less-than-truckload (LTL) market. Less highly organized are irregular route and special commodity carriers and private carriers operating in the truckload (TL) market.

National bargaining by the Teamsters was achieved in 1964 in the first National Master Freight Agreement (NMFA), which shifted bargaining power from the regional to national level. While the NMFA was a major victory for Jimmy Hoffa in his move to centralize bargaining, there continued to exist regional bargaining and diversity in contracts. NMFA contracts have followed every three years since 1964, the most recent agreement going into effect in April, 1985. (Detailed histories of collective bargaining in the industry are provided by Levinson 1982 and Perry 1986.)

While it would be convenient to date deregulation of the trucking industry with the final passage in June of the Motor Carrier Act of 1980, union labor faced increasing competition in the industry throughout the 1970s. This competition arose in part as a natural economic response to inefficiencies and cost differentials engendered by past regulation and union wage increases. In addition, there were increased legal restrictions on Teamster activities and administrative deregulation within the ICC. Beginning in the mid-sixties, the Teamsters were increasingly constrained in their use of secondary boycotts and in their ability to restrict nonunion traffic. By 1980, nonunion trucking operations had already increased their share of the market, as evidenced in particular by the rapid growth of private carriers and of nonunion owner-operators in the TL market.

Beginning in 1977, ICC administrative deregulation expanded the areas under which trucking operations were exempt from federal control and eased entry restrictions, although most awards of certificates were for extensions in service by existing carriers and not entry by new carriers. And in a series of important decisions beginning in late 1978, the ICC allowed companies hauling their own goods to apply for authority to haul for others, abolished regulations limiting contract carriers to service no more than eight shippers, expanded airport zones which were exempt from regulation, and announced they would consider rates a factor in granting operating rights (Moore 1983).
The Motor Carrier Act of 1980 effectively eliminated barriers to entry through a weakening of the public need test, removed most restrictions on operations (e.g., route and commodity designations), and allowed individual variation in rates until January 1, 1984, at which time collective rate bureaus were no longer exempt from antitrust action. Much of the bill was an attempt to codify (and even limit) changes that were already taking place. The direct effects of the MCA of 1980 were not easily discernible, however, since Congressional deregulation simply sped changes in the industry that had been occurring for some time, and because of a recession that brought about a significant decline in traffic.

While the magnitude of the effects from deregulation remain to be determined, there is no question that it facilitated exactly the qualitative responses that theory would predict (Perry 1986). There has been increased entry of low-cost and nonunion firms, a collapse in prices for operating licenses, a high rate of business failure in trucking markets most affected by entry, increased alternatives and price discounting available to shippers, rates that more closely reflect marginal costs and a lessening of cross-subsidization between lines of service, improved efficiency and greater innovations in operations, and fuller coordination with alternative freight systems (e.g., "piggybacking" freight with railroads). Deregulation reversed the previous shift of traffic from regulated for-hire motor carriers to unregulated private carriers; between 1977 and 1983 the shares of tonnage carried increased sharply among for-hire motor carriers, decreased moderately among private motor carriers, and fell sharply among railroads (Boyer 1987). The market share of union trucking and Teamster employment continued their decline, with significant downward pressure on wage rates.

III. Employment and Wages of Union and Nonunion Drivers

As discussed above, regulation in the trucking industry made possible supra-competitive wages for several reasons. ICC restrictions on entry and rate competition permitted cost inefficiencies to survive. Ratemaking through bureaus allowed regional and industry-wide wage increases to be largely passed through to shippers and took wage rates out of competition. And the nature of ICC regulation in the motor carrier industry allowed the Teamsters to acquire significantly more bargaining power than could have been obtained by a union operating in a more competitive environment. In fact, evidence of large union wage premiums in the trucking industry contrast with evidence from electric
utilities and other regulated industries (Hendricks 1977, 1986), where firm-level rate regulation and wage bargaining appear to limit union power (but see Ehrenberg 1979 and Perloff and Wachter 1984 for evidence of substantial wage premiums in the unionized New York Telephone Company and U.S. Postal Service, respectively). Because regulation of the trucking industry allowed substantial rents to accrue to labor, deregulation is expected to have affected employment, labor earnings, and the union-nonunion wage differential.

Industry employment is likely to be positively affected in the long run, due to substitution and scale effects associated with lower labor costs, and to an increased volume of freight resulting from greater rate competition. For given levels of freight, however, the ratio of drivers to capital (and possibly other labor) may be lower following deregulation. Decreased labor intensity is possible owing, in part, to the reduction in inefficiencies previously engendered by regulation or union work rules (e.g., return routes with empty trailers and restrictions on loading at intermediate points on intercity routes). In addition, the use of operating ratios in setting rates, whereby labor (i.e., operating) costs but not all capital costs could be passed through to shippers, may have led to a higher ratio of labor to capital during the regulatory period than is likely to exist in the absence of regulation. Finally, if regulatory constraints caused trucking firms to have suboptimal capacity utilization, deregulation may lead to decreases in the use of all factors per ton mile. Kim (1984), who examines this possibility using Canadian evidence, concludes that labor is the largest loser from trucking deregulation.

Union bargaining power made possible by ICC regulation clearly increased union wages, whereas its effect on nonunion wage rates is less clear. To the extent that nonunion drivers were in relatively competitive

3. If the union and firms bargained simultaneously over wages and employment, "efficient" bargaining outcomes along a vertical contract curve could obtain, whereby union employment would vary with the nonunion (opportunity cost) wage but not with the union premium (MaCurdy and Pencavel 1986). Efficient bargaining is unlikely to arise in the for-hire trucking industry sector, however, since union wages are determined by national and/or regional bargaining agreements, but employment is set by individual firms. Hence, sequential wage and employment determination makes it likely that outcomes lie on firms' labor demand curves.

4. For an explanation of the labor bias under regulation, see Moore (1978, 332). Of course, since operating ratios were not applied at the firm level, individual carriers retained incentives (if not pressure) to minimize costs. Daughety and Nelson (1986) analyze input use and the production structure in the motor carrier industry using a time-series, cross-section database of trucking firms for 1954–58, 1968, 1978, and 1982. They find similarities in the cost functions for the fifties and for 1982, but large differences among the regulatory period samples.
or unregulated sectors with easy entry, nonunion wages would have been close to competitive levels during the regulatory period. On the other hand, the presence of a strong union may have increased nonunion wages due to threat effects, since nonunion carriers were willing to pay some premium in order to deter union organizing.\(^5\) Threat effects presumably were larger among nonunion drivers in the regulated for-hire sector of the industry than among drivers working in the largely unregulated private carrier sector, not only because of differences in the ease of entry, but also because the former market was where the Teamsters had their greatest bargaining strength and organizing ability. Similarly, threat effects are more likely to have occurred in regions of the country with low levels of nonunion trucking operations.

Deregulation is likely to lead to a decreased wage level in the industry as increased rate competition and entry place cost pressures on carriers. A decrease in union coverage and bargaining power should make possible decreases in union and possibly nonunion wages and, in the long run, lead to somewhat higher turnover and lower labor quality. Evidence that nonunion wages following deregulation do not fall, or that they move closely with the wage rates of similar nonunion workers outside of trucking, would suggest that threat effects were small and that nonunion wage rates for truckers were close to competitive levels during the regulatory period.\(^6\) Indeed, the average industry wage level would decrease following deregulation through a shift of employment from union to nonunion drivers, even if there were no changes in union and nonunion wage rates.

While average wage levels will decrease, deregulation's immediate effect on the union-nonunion wage differential is ambiguous. Decreased union bargaining power and a lessened ability to restrict the expansion of nonunion carriers are likely to reduce the spread between union and nonunion wages in the long run. On the other hand, nonunion wages could exhibit greater short-run flexibility in the face of entry and price competition. To the extent that the Teamsters maintain bargaining power within a narrow segment of the industry (i.e., the for-hire LTL long-haul market), or are relatively intransigent in accepting wage concessions, the union-nonunion wage differential is more likely to be maintained or increased.

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\(^5\) Recent studies providing evidence that nonunion wages in manufacturing and non-manufacturing are positively and significantly affected by union density in workers' three-digit industry include Moore, Newman, and Cunningham (1985); and Hirsch and Neufeld (1987).

\(^6\) Partially offsetting the downward pressure on wage levels are any increases in freight traffic and labor demand owing to rate decreases. To the extent that the labor supply of truck drivers is highly elastic, increased traffic should have little long-run effect on equilibrium wages.
Maintenance of a high wage differential, however, is likely to be associated with declining union employment and long-run bargaining power in the industry.

IV. Data and Modeling

In order to examine union and nonunion wages of truckers, prior to and following deregulation, the May Current Population Survey (CPS) tapes for the years 1973–81 and 1983–85 are used (there was no union question in the 1982 survey). The sample includes all male truck drivers in the labor force, ages 16 to 64, who have data provided on usual weekly earnings, usual hours worked per week, union status, and whose hours worked are 30 or greater. Following our earlier discussion, the period of ICC regulation is defined as 1973–78, whereas the period 1979–85 is considered the deregulation period. Even though the Motor Carrier Act was not passed until June 1980, administrative deregulation in late 1978 significantly eased entry and set expectations for continued and permanent deregulation within the industry. Perhaps the most direct evidence of deregulation’s expected effects is the average sale price of operating licenses, which fell from $531,000 in 1977, to $370,000 in 1978, to only $55,000 in 1979 (all figures are in 1982 dollars). Both the price and volume of traded licenses collapsed after 1979 (Moore 1983).

Analyzed separately are truck drivers in the for-hire or common carrier sector of the industry, defined as drivers who identified their industry of employment as the trucking service industry, and drivers in the private carrier sector, defined as drivers who identified their industry of employment as something other than the trucking service industry (owner operators whose designated class of worker is self-employed are not included, due to the absence of earnings information for these workers). Drivers in the for-hire sector sample, which includes both general commodity and contract carriers, were affected directly by ICC regulation and deregulation, whereas drivers in the largely unregulated private carrier sector were affected only indirectly by regulation. The wages of both groups of drivers are subsequently compared to those of a one-in-two

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7. Rose (1986) also treats 1979 as the beginning of the deregulation period. Administrative changes by 1978 had effectively deregulated the TL market, whereas the LTL market was not deregulated until after passage of the MCA of 1980. We are unable to separate TL and LTL drivers in the data. Year-to-year changes in wages and union premiums are subsequently summarized, however, in order to examine the sensitivity of results to the dating of the regulatory period.
control group sample of nontransport operatives meeting the same criteria listed above.\textsuperscript{8}

We first estimate the following log wage equations for the truck driver samples in both the for-hire and private carrier sectors:

\[ \ln(W)_{ij} = \Sigma \beta_k X_{ijk} + \alpha_1 DREG_{ij} + \alpha_2 UN_{ij} + \alpha_3 UN \cdot DREG_{ij} + e_{ij}, \]

where \( i \) indexes individuals, \( j \) indexes year, \( \ln(W) \) is the natural logarithm of hourly earnings in 1985 dollars, \( DREG \) is a dummy variable equal to 1 for the deregulation years 1979–85, \( UN \) is a dummy variable equal to 1 if the worker is a union member, \( UN \cdot DREG \) is a union-deregulation interaction variable, and \( e \) is a stochastic error term with zero mean and constant variance. The control vector \( X \) includes a constant \( (X_0 = 1) \) and \( k \) variables including years of schooling completed \( (S) \); years of experience and experience squared, proxied by \( \text{Age-S-5} (EXP \text{ and } EXP^2) \); and dummy variables equal to 1 if the worker is nonwhite \( (NW) \), married with spouse present \( (MARRIED) \), a veteran \( (VET) \), or in each of 9 Census regions \( (REGION) \).\textsuperscript{9}

The coefficient \( \alpha_1 \) measures for nonunion truckers the log differential in

\textsuperscript{8} The control group of nontruck operatives was chosen because it seemed most likely to contain "comparable" individuals not directly affected by trucking deregulation. Among the occupations included in the control group are assemblers, inspectors, packers, machine operatives, sewers and stitchers, and welders. Because of the use of revised occupational codes in the CPS beginning in 1983, only occupations for which exact matches could be made over the two subperiods were included in our sample. Drivers are classified by the CPS as "heavy" or "light" truck drivers beginning in 1983. The relatively small number of "light" drivers were excluded since it is believed most were classified as "deliverymen and routemen" prior to 1983. Overall sample sizes are smaller after 1978 because fewer persons were asked the earnings and unionization questions. The survey question on which the union status variable is based changed several times over the 1973–85 period. The 1973–75 surveys asked, "Does . . . belong to a labor union?" The 1976–78 surveys added to the end, " . . . or employee association." The 1979–81 surveys revised this to read, " . . . or employee association similar to a union." The May 1983 CPS Pension and Retirement Plan Coverage survey asked, "Is . . . covered by a union or employee association contract?" (Earnings and hours information for part of the 1983 sample were matched with the June questionnaire.) The 1984–85 surveys return to the 1979–81 form of the union question. In later years, nonunion workers were asked if they were covered by a union contract, but use of a union coverage variable in those years produced highly similar results. None of the results appear to be affected measurably by changes in the union status variable.

\textsuperscript{9} Also estimated were log earnings equations with the log of hours worked per week on the right-hand side. Letting \( E \) be usual weekly earnings, \( HRS \) usual hours worked per week, and \( W \) the wage, \( \ln(W) = \ln(E/HRS) = \ln(E) - \ln(HRS) \). Hence, an earnings equation of the form \( \ln(E) = \beta X + \tau \ln(HRS) \) is equivalent to the wage equation \( \ln(W) = \beta X \iff \tau = 1 \). In estimates here, the parameter \( \tau \) for truckers is found to be significantly less than one, indicating that earnings increase less than proportionately with reported hours of work. No important conclusions are affected by the use of a wage rather than earnings equation; hence, the more commonly used wage specification results are reported here.
wages in the deregulatory relative to the regulatory period, \( \alpha_2 \) is the union-nonunion log wage differential for truckers in the regulatory period, and \( \alpha_3 \) measures the change in the union premium during the deregulatory period (the union premium after 1979 equals \( \alpha_2 + \alpha_3 \)). Percentage differentials, \( D \), are approximated by \( D = (e^D - 1)100 \).

In order to compare the wage performance of truck drivers with a control group of non-transport operatives, a wage equation of the following form is estimated:

\[
\ln(W)_{ij} = \Sigma \beta_k X_{ijk} + \delta_1 UN_{ij} + \delta_2 DREG_{ij} + \delta_3 TR_{ij} + \delta_4 TR \cdot DREG_{ij} + \delta_5 UN \cdot DREG_{ij} + \delta_6 UN \cdot TR_{ij} + \delta_7 UN \cdot TR \cdot DREG_{ij} + e_{ij},
\]

where \( TR \) is a dummy variable equal to one if the worker is a truck driver and 0 if a nontruck operative, and other notation is as above. In this specification \( \delta_1 \) is the union-nonunion log wage differential for nontruck operatives in the regulation period and \( \delta_1 \) plus \( \delta_5 \) is the differential during the deregulation period, \( \delta_2 \) is the log wage change between the deregulation and regulation periods for nonunion non-truck operatives, \( \delta_3 \) is the differential between nonunion truck drivers and the operative control group during the regulatory period while \( \delta_4 \) is the change in that differential following deregulation, \( \delta_6 \) is the difference between the operative and truck driver union premiums during the regulatory period, and \( \delta_7 \) is the change in that difference during the deregulatory period.

The model above is convenient for purposes of exposition in that wage differentials for four groups—truck drivers and nontruck operatives classified by union status—can easily be compared for the regulatory and deregulatory periods. A more detailed analysis would allow wage differentials among the four groups to vary for each of the twelve survey years. Such a model was estimated and results (available on request) are discussed briefly in Section VI.

The major focus in this paper is on the earnings performance of union and nonunion truckers prior to and following deregulation, and changes in

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10. For a comparison of more exact measures of \( D \), see Giles (1982). Alternatively, estimates of the differential could be obtained based on estimation of separate union and nonunion equations, whereby the log differential, \( d \), is equal to \( (\beta_u - \beta_n)\bar{X} \), where \( \bar{X} \) is the mean value (union, nonunion, or weighted) of the explanatory variables. For ease of reporting and in order to lower the variance of the estimates (since sample sizes of truckers are not large in later years), the dummy variable approach is used in estimating the differential. While this may introduce bias into our estimates, bias may be less serious than the increase in variance, from, say, separate regressions by year, union status, and occupation (trucker or nontrucker). Surveys of alternative estimation methods are contained in Lewis (1986) and Hirsch and Addison (1986).
the union wage premium over time. Pensions, nonpecuniary benefits, and contractual provisions (e.g., two-tier wage schedules) cannot be analyzed explicitly with these data. It is expected that wages for union and possibly nonunion truckers declined as a result of deregulation. Expectations as to the behavior of the union-nonunion wage differential are not entirely clear, however, since nonunion as well as union wages may have declined and nonunion wage rates may exhibit greater short-run flexibility. It seems likely, however, that in a long-run competitive environment, the union wage premium must fall, particularly if nonunion wages were close to competitive levels prior to deregulation.

Also of interest are differences in the above effects between truck drivers in the regulated for-hire and largely unregulated private carrier sectors of the trucking industry, the timing of the above changes, and any regional differences in the effects of deregulation. Our expectation is that the effects of deregulation were felt most strongly in the for-hire segment of the industry, although wages in the private carrier sector can be expected to have moved in a similar direction. Administrative deregulation in the late seventies suggests downward pressure on trucking wages at least by 1979, while the time lag required for long-run supply responses, negotiation of labor contracts, and the like, suggest that the full response to deregulation would not be observed for several years following deregulation. Because there were changes in business cycle conditions and demand-supply forces that affected the labor market for truckers independent of deregulation, comparison of truckers’ wages to those of similar nontruck operatives is necessary before drawing any final conclusions as to the effects of deregulation. Finally, regional differences in the strength of union organizing suggest that separate analyses by region may provide insight into the effects of trucking deregulation.

V. Empirical Results: The Trucking Samples

Before analyzing regression results, it is useful to examine the pattern of union and nonunion wages and of union density over the 1973–85 period. Table 1 presents descriptive data on the CPS sample for wages, hours, and union membership of truck drivers in the for-hire and private carrier sectors of the industry. Note that overall sample sizes are reduced after 1978 because the earnings, hours, and union status questions were not asked of the full sample. Perhaps most notable is the sharp decrease in union coverage during the deregulation period. This decline is most concentrated among the approximate one-third of the total sample in the for-hire sector of the industry. Here union density fell from about 60 percent during the regulatory period, to about 30 percent by 1984–85. By
contrast, the fall in union density among private carrier truckers was less marked, from about 35–40 percent during the regulatory period to about 30 percent during 1984–85.

The small sample sizes for the later years makes us cautious in attaching undue weight to the mean in any given year. The sharp decline in union density is consistent, however, with Teamster membership losses reported elsewhere. Perry (1986, 110) estimates that the number of Teamsters covered by the NMFA fell by between 18 and 34 percent between the 1982 and 1985 contracts. Using union financial reports, Troy and Sheflin (1985; personal correspondence) find that the Teamsters’ U.S. membership, which peaked in 1974 at 1.95 million, had declined to 1.52 million in 1983 and 1.54 million in 1984.\footnote{The Troy and Sheflin membership data are dues-weighted annual averages, whereas the CPS figures are for May. Hence, membership losses after, say, May 1983, would show up in the 1983 Troy-Sheflin figures, but not until 1984 in the CPS. Data on Teamster membership of course reflect a large number of workers who are not truck drivers.}

The pattern of hourly earnings for union and nonunion truckers indicates declining real wages among union truck drivers in the for-hire sector...
following deregulation.\textsuperscript{12} Union real wages, which were relatively stable and averaged (unweighted) $12.45 during the 1973–78 period, averaged “only” $11.15 during the 1979–85 deregulation period. No clear-cut pattern is evident among the other three groups of drivers. Nor are there any systematic changes in average hours worked between the regulatory and deregulatory periods.\textsuperscript{13} While the descriptive evidence is informative, inferences about deregulation’s effects on wages and the union premium should not be drawn until we estimate a wage function accounting for worker and labor market characteristics, as well as comparing trucking wage rates with those prevailing elsewhere in the economy.

Table 2 provides regression results for Equation (1), estimated separately for drivers employed in the for-hire and private carrier sectors. Brief mention of the control variable coefficients can be made. As expected, the coefficients on schooling are low, reflecting not just a lack of importance of schooling for truck drivers, but also the low marginal returns to individuals within any narrowly defined occupation (i.e., such samples are self-selected and schooling coefficients fail to measure returns from occupational mobility). Other results indicate that drivers exhibit typical wage-experience profiles, nonwhites have wages approximately 10 percent below whites, veterans exhibit a 3 percent premium, and married males earn a 4–5 percent premium. While the coefficients on the regional dummies are not shown in Table 2, they indicate that drivers in the Pacific and, to a lesser extent, the East North Central and Mountain regions, realize significantly higher wages than in other regions (these results are available on request).

\textsuperscript{12} Real wages are calculated as usual weekly earnings, in 1985 dollars, divided by usual hours worked per week. The Personal Consumption Expenditures (PCE) component of the GNP deflator is used to convert current in 1985 dollars (\textit{Economic Report of the President}, 248). Alternative adjustment by the CPI, which overstates the “true” rate of inflation, makes it appear that real wages for truckers and nontruckers alike declined during the eighties. No inferences regarding deregulation and the union premium are affected by use of the PCE, although the sensitivity of real wages to the choice of a price index reinforces the importance of employing an economy-wide control group. The 1985 union sample of truckers appears unrepresentative to some degree—those in the for-hire sector are atypically young and have low wages (but see footnote 19), while those in the private sector are atypically experienced with higher wages.

\textsuperscript{13} Department of Transportation (DOT) regulations place limits on allowable hours by drivers. While rather complex, the gist of the regulations is to restrict hours to no more than ten hours without an eight-hour break, and 60 hours over seven consecutive days. It is generally believed that these hours restrictions are frequently violated, although trucking firm records do not report such violations. If truck drivers accurately report their hours in the CPS survey, such data would allow measurement of adherence to the regulations. Over the 1973–85 period, only 6.9 percent of the for-hire sector sample report over 70 hours of work the previous week, while 3.5 percent of the private carrier sample report over 70 hours.
Table 2
Regression Results—Wage Equation Estimates for Truck Drivers, 1973–85

<table>
<thead>
<tr>
<th>Variable</th>
<th>For-Hire Sector</th>
<th>Private Carrier Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.569 (25.26)</td>
<td>1.415 (42.74)</td>
</tr>
<tr>
<td>Schooling</td>
<td>.021 (4.92)</td>
<td>.020 (8.39)</td>
</tr>
<tr>
<td>Experience</td>
<td>.015 (5.34)</td>
<td>.020 (13.02)</td>
</tr>
<tr>
<td>Exp²/100</td>
<td>−.025 (4.44)</td>
<td>−.033 (11.34)</td>
</tr>
<tr>
<td>Nonwhite</td>
<td>−.105 (3.74)</td>
<td>−.082 (5.51)</td>
</tr>
<tr>
<td>Veteran</td>
<td>.034 (2.06)</td>
<td>.025 (2.27)</td>
</tr>
<tr>
<td>Married</td>
<td>.036 (1.56)</td>
<td>.050 (3.89)</td>
</tr>
<tr>
<td>Region</td>
<td>included</td>
<td>included</td>
</tr>
<tr>
<td>DREG</td>
<td>.026 (1.05)</td>
<td>.001 (0.11)</td>
</tr>
<tr>
<td>UN</td>
<td>.392 (19.24)</td>
<td>.300 (23.18)</td>
</tr>
<tr>
<td>UN · DREG</td>
<td>−.128 (3.78)</td>
<td>−.022 (0.96)</td>
</tr>
<tr>
<td>$\bar{R}^2$</td>
<td>.279</td>
<td>.330</td>
</tr>
<tr>
<td>n</td>
<td>2,203</td>
<td>4,446</td>
</tr>
</tbody>
</table>

Note: $|t|$ in parentheses.

Estimates presented in Table 2 do not directly compare the earnings differential between drivers in the for-hire and private sectors. Such a comparison, however, indicates a premium just under 10 percent among drivers in the for-hire sector, relative to drivers with similar measured characteristics in the private carrier sector. This may reflect a compensating differential for more difficult working conditions among drivers in the for-hire sector, unmeasured quality differences between drivers in the two sectors, or stronger union power in the for-hire sector that raises wages for both union and nonunion drivers. We return to the issue of threat effects on nonunion wages subsequently.

Of principal interest in Table 2 are the coefficients on DREG, UN, and UN · DREG. Prior to deregulation, we estimate a 48 percent union wage premium in the regulated for-hire sector, as compared to a 35 percent premium in the unregulated private carrier sector. Following deregulation, nonunion wages were little changed in either sector, suggesting that threat effects were not important during (or have not changed since) the regulatory period. Most interesting is the evidence on changes in the union premium with the onset of deregulation. The premium fell significantly in the for-hire sector, from 48 to 30 percent (for equivalent evi-
dence, see Rose 1987). In marked contrast, the union premium in the private carrier sector fell only slightly to about 32 percent. Whereas prior to 1979, the regulated sector of the trucking industry exhibited higher union coverage and a larger union premium than the unregulated sector, similar union wage premiums and union density are observed following deregulation in both the private carrier and for-hire sectors of the industry.

Despite the substantial deterioration in Teamster bargaining strength and the union's modest contract "gains" in its 1979, 1982, and 1985 contracts, the differential between union and nonunion wages remained large in both sectors, however. It appears that there would have to have been more substantial concessions in wages in order to have slowed the inroads made into the industry by nonunion companies and drivers.

VI. Empirical Results: Truckers and Nontruck Operatives

The analysis presented above compares the wages of union and nonunion drivers before and after deregulation. It cannot be concluded, however, that all changes between the two periods resulted from deregulation. Coinciding with deregulation were substantial increases (and, subsequently, decreases) in gasoline prices, a sharp recession followed by a recovery, a structural shift of employment away from production and manufacturing jobs toward those in the service sector, and changes in the economic environment that weakened union bargaining power and decreased membership economy-wide. Hence, it is useful to compare the wages of union and nonunion truckers during this period to those of otherwise similar workers outside of trucking. We have chosen as a control group a sample of nontransport operatives.

To examine the issues discussed above, Equation (2) is estimated. The partial results presented in Table 3 allow comparison of wages for four groups during the regulatory and deregulatory periods: nonunion nontruck operatives, union nontruck operatives, nonunion truckers, and union truckers (i.e., the seven included variables account for all eight possibilities; the excluded group is nonunion nontruck operatives during the pre-1979 period). Separate regressions are estimated for drivers in the for-hire and private carrier sectors (both equations include the same operative control group).14

14. When we calculate an F test comparing a "restricted" regression with all truckers (including a for-hire intercept dummy) with separate regressions for drivers in the for-hire and private sectors of the industry, we obtain $F(17, 6613) = 2.961$. Using the standard
The coefficients on $TR$ show that truck drivers in the for-hire sector earn about 4 percent more, and drivers in the private sector about 4 percent less, than the control group of operatives. The $DREG$ coefficient, $\delta_2$, indicates that the real wages of nonunion nontruck operatives grew by only 1 percent between the 1973–78 and 1979–85 periods. The coefficients $\delta_1$ on $TR \cdot DREG$ are close to zero and insignificant, indicating no change in the relationship between the wages of nonunion truck drivers and the control group of nonunion operatives during the deregulation period. The evidence, therefore, provides no support for the hypothesis of significant industry-specific threat effects, which would have been evidenced by decreasing nonunion wages in response to lower union density in the trucking industry. Of course, increased demand for nonunion drivers might have offset declining threat effects were the supply of nonunion drivers relatively inelastic, but it is more likely that supply was highly elastic. Thus, the wages of nonunion drivers appear to have been competitively determined, with changes over time mirroring wage changes of similar workers outside of trucking.

Equation (2) also allows comparison of the union-nonunion differentials among truckers and nontruck operatives. The differential among the control group of operatives averaged about 29 percent from 1973 through 1978, and exhibited a small and insignificant decrease during the eighties (as seen in the coefficients on $UN \cdot DREG$). Relative to nontruck operatives, truckers exhibited a significantly higher union premium during the seventies (coefficients $\delta_6$)—about 13 percentage points higher among drivers in the regulated sector and 6 percentage points higher among those in the unregulated sector. (The calculated union-nonunion log differentials for truck drivers, $\ln W/\ln UN_{TR}$, are also presented in Table 3.) Deregulation brought about a significant narrowing of the union premium in the for-hire sector, however, decreasing the differential by about 10 percentage points (coefficient $\delta_7$). By contrast, there was virtually no change in the union premium in the private carrier sector. Following deregulation, union premiums were similar in magnitude among nontruck operatives

criterion, we reject (at the .05 significance level) the null hypothesis of equal slope coefficients in the two sectors. However, using the weaker mean squared error criterion proposed by Wallace (1972), or a test proposed by Leamer (1978, 114) that adjusts for sample size, the null hypothesis cannot be rejected (critical values at the .05 level are 3.081 for the Wallace test and 9.005 for the Leamer test).

15. Separate estimates on a yearly basis indicate higher premiums during 1976–78 than during 1973–75 and variability in the union premium during later years. Such results have been evident in previous CPS studies. See, for example, Freeman (1986) and, for a survey of studies with data through 1979, Lewis (1986). Both authors discuss differences between CPS estimates and those obtained from other data sources.
Table 3
Partial Wage Equation Results Comparing Truck Drivers and Non-Transport Operatives, Nationally and by Region, 1973–1985

<table>
<thead>
<tr>
<th>Variable</th>
<th>For-Hire Sector Comparison</th>
<th>Private Carrier Sector Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nation</td>
<td>Northeast</td>
</tr>
<tr>
<td>( UN )</td>
<td>.254</td>
<td>.183</td>
</tr>
<tr>
<td>( DREG )</td>
<td>.012</td>
<td>.033</td>
</tr>
<tr>
<td></td>
<td>(1.15)</td>
<td>(1.37)</td>
</tr>
<tr>
<td>( TR )</td>
<td>.040</td>
<td>.115</td>
</tr>
<tr>
<td></td>
<td>(2.73)</td>
<td>(2.85)</td>
</tr>
<tr>
<td>( TR \cdot DREG )</td>
<td>.008</td>
<td>-.148</td>
</tr>
<tr>
<td></td>
<td>(.33)</td>
<td>(2.30)</td>
</tr>
<tr>
<td>( UN \cdot DREG )</td>
<td>-.018</td>
<td>-.042</td>
</tr>
<tr>
<td></td>
<td>(1.19)</td>
<td>(1.27)</td>
</tr>
<tr>
<td>( UN \cdot TR )</td>
<td>.124</td>
<td>.074</td>
</tr>
<tr>
<td>-----------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>( (6.45) )</td>
<td>(1.54)</td>
<td>(4.98)</td>
</tr>
<tr>
<td>( UN \cdot TR \cdot DREG )</td>
<td>-.108</td>
<td>.009</td>
</tr>
<tr>
<td>( (3.10) )</td>
<td>( .11)</td>
<td>(.85)</td>
</tr>
<tr>
<td>( \bar{R}^2 )</td>
<td>.319</td>
<td>.251</td>
</tr>
<tr>
<td>( n )</td>
<td>12,750</td>
<td>2,650</td>
</tr>
<tr>
<td>( \ln W/\ln UN_{TR} ) (1973–78)</td>
<td>.378</td>
<td>.258</td>
</tr>
<tr>
<td>( (21.32) )</td>
<td>(5.72)</td>
<td>(13.29)</td>
</tr>
<tr>
<td>( \ln W/\ln UN_{TR} ) (1979–85)</td>
<td>.252</td>
<td>.225</td>
</tr>
<tr>
<td>( (9.69) )</td>
<td>(3.66)</td>
<td>(7.56)</td>
</tr>
<tr>
<td>( P_{TR}: 1973–78 )</td>
<td>.599</td>
<td>.720</td>
</tr>
<tr>
<td>( P_{TR}: 1979–85 )</td>
<td>.482</td>
<td>.563</td>
</tr>
</tbody>
</table>

Note: \(| r | \) in parentheses. All regressions include a constant; years of schooling, experience, and experience squared; and dummies for non-white, veteran, and marital status. The national regressions include eight subregional dummies, while the large-region regressions include subregion dummies. The differentials \( \ln W/\ln UN_{TR} \) are calculated as \( \delta_1 + \delta_5 \text{REG} + \delta_6 \text{TR} + \delta_7 \text{TR} \cdot DREG \) (see Equation 2). \( P_{TR} \) represents the mean union density of truck drivers for the group and period designated. The control group sample of nontruck operatives is the same in both the for-hire and private sector comparison regressions. The omitted reference category is nontruck nonunion operatives during 1973–78.
and drivers in both the previously regulated and unregulated sectors of the trucking industry.16

Further insight into the effects of trucking deregulation is gained from an analysis of inter-area differences in wage determination. Table 3 presents estimates of Equation (2) estimated separately for each of the four major Census regions.17 The bottom two rows of Table 3 also present average union density among truck drivers in each region during the regulatory and deregulatory periods. Evident from the coefficients on $UN \cdot TR \cdot DREG$ is that the significant reduction in the union premium previously reported for the for-hire sector occurred most strongly in the South and West, where levels of nonunion operations were highest. For example, the union wage premium for truckers in the South is estimated to have fallen from 54 percent during the regulatory period to 31 percent following deregulation. A similar pattern is found in the West and, to a lesser extent, the North Central. By contrast, the union-nonunion wage differential among drivers in the highly unionized Northeast was 25–29 percent during both periods. These results support the view that in the absence of regulatory protection, union trucking was most able to maintain its regulatory-period wage differential in regions with high union density, and least able to maintain these premiums in regions with extensive nonunion operations. The decrease in union density in all regions, however, suggests weakened union bargaining power and continued pressure to narrow union-nonunion wage differentials.

Closely related to the above is the finding of evidence suggesting threat effects (or nonunion rent sharing) among nonunion drivers in the highly unionized Northeast. Whereas nonunion drivers in the Northeast received a 12 percent premium relative to the control group of operatives during the regulatory period, this premium was eliminated following deregulation and the accompanying decrease in union density from 72 to 56 percent. No evidence of threat effects is found in the other three regions. Results from the largely unregulated private carrier sector indicate that deregulation generally had similar qualitative, but smaller quantitative, effects in this sector. Coefficient estimates at the regional level have large standard errors.

In a separate analysis not shown (but available on request), a variant of

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16. The logarithmic union-nonunion wage differential is calculated by $\ln(W) = \delta_1 + \delta_2 DREG + \delta_3 TR + \delta_4 TR \cdot REG$ for truck drivers and nontruck operatives, before and after deregulation.

17. F tests comparing the “restricted” national regressions with the “unrestricted” regional regressions are $F(39, 12689) = 3.523$ in the for-hire sector and $F(39, 14932) = 4.929$ in the private sector. The null hypothesis of equal slope coefficients across regions is rejected for both sectors using standard criteria or the Wallace test, but cannot be rejected in either case using Leamer’s test (see footnote 14).
Equation (2) was estimated in which individual year dummies are interacted with $UN$, $TR$, and $UN \cdot TR$. This provides separate estimates for the four groups (union/nonunion truckers/nontruckers) for each of the 12 sample years. While there exists year-to-year variability in results, particularly for the later years with small sample sizes, the overall picture that emerges is largely identical to that presented here. One result evident from the yearly analysis, however, is that there was a significant decline in the wages of both nonunion truckers and nontruck operatives in the years 1983–85, as compared to 1979–81. The suggestion is that the 1981–82 recession, in conjunction with structural changes in the economic environment, brought about a significant and long-lived decline in real wages among male operatives. Annual estimates of the union premium among for-hire sector drivers indicate that it fell during 1979–81, rebounded in 1983–84, and dropped sharply in 1985.\(^{18}\)

While it is evident that Teamster bargaining power and the union-nonunion differential in the for-hire sector declined relative to what it would have been in the absence of deregulation, it remained large. The ability of the IBT to maintain sizable wage differentials, albeit for a significantly reduced part of the industry, may have stemmed in part from the ability of some large carriers to increase labor productivity by taking advantage of increases in size and weight limits, by adopting new equipment technology, and because of union work rule concessions.

Nevertheless, the union premiums realized by truckers and nontruck operatives during the eighties remained substantial; significantly higher than, say, the historic premium found for production workers in the manufacturing sector (Lewis 1986, Section 7–5). In the face of continued sizable wage differences between union and nonunion drivers, the shift of freight to nonunion firms and drivers has been large. While limited adjustments had begun prior to deregulation, administrative actions in the late 1970s and the MCA of 1980 clearly facilitated such shifting on a large scale. For there not to have been such an increase in nonunion trucking, a

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\(^{18}\) Annual cross-section log wage regressions for the for-hire sector (containing the same control variables as in Equation 1) produced the following estimates of the union-nonunion wage differential ($\ln(\tilde{w})$ in parentheses):

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimate (t-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>0.470 (7.88)</td>
</tr>
<tr>
<td>1974</td>
<td>0.337 (6.27)</td>
</tr>
<tr>
<td>1975</td>
<td>0.355 (5.69)</td>
</tr>
<tr>
<td>1976</td>
<td>0.373 (7.40)</td>
</tr>
<tr>
<td>1977</td>
<td>0.431 (10.22)</td>
</tr>
<tr>
<td>1978</td>
<td>0.353 (6.94)</td>
</tr>
<tr>
<td>1979</td>
<td>0.244 (3.87)</td>
</tr>
<tr>
<td>1980</td>
<td>0.156 (1.64)</td>
</tr>
<tr>
<td>1981</td>
<td>0.170 (2.02)</td>
</tr>
<tr>
<td>1982</td>
<td>0.244 (3.87)</td>
</tr>
<tr>
<td>1983</td>
<td>0.324 (5.26)</td>
</tr>
<tr>
<td>1984</td>
<td>0.360 (4.02)</td>
</tr>
<tr>
<td>1985</td>
<td>0.106 (1.10)</td>
</tr>
</tbody>
</table>

National Master Freight Agreements (NMFAs) went into effect in April 1973, 1976, 1979, 1982, and 1985. Counter to the above evidence on union premiums, contract provisions in the 1979 NMFA generally have been regarded as generous to drivers, whereas provisions in the 1982 NMFA are considered less favorable (for a summary of contract provisions, see Perry 1986 and Rose 1987).
significant narrowing of the union-nonunion differential would have had to occur immediately following deregulation. Despite some concessions and the moderate nature of the 1982 and 1985 NMFA contracts, at least by historical standards, wage differentials between union and nonunion truck drivers remained large following deregulation.

VII. Conclusions

The regulatory experience in the trucking industry provides an ideal area in which to study the creation and dissolution of economic rents resulting from entry, price, and operating restrictions. Previous studies (Moore 1978, Frew 1981, Rose 1985) have provided compelling evidence that a portion of the regulatory rents were captured by trucking firm owners and the initial owners of route certificates. Additional rents arising from deregulation were reflected not in higher profits or in the market value of operating rights but, rather, in the form of higher labor costs. The evolution of the powerful Teamsters union during the period of ICC regulation facilitated the capture of sizable wage gains for union members and, to a much lesser extent, nonunion drivers. The deregulation experience provides evidence as to the magnitude of the regulatory rents that previously accrued to labor and the speed of adjustment to competitive wage levels.

Regression analysis on the wages of union and nonunion truck drivers from 1973–1985 indicates a significant decrease in wages for union drivers in the for-hire sector of the trucking industry following deregulation. Comparison of truck drivers’ wages with those of a nontruck operative control group reveals that changes in the real wages of nonunion drivers were very similar to those of operatives outside of trucking. While the union-nonunion wage differential in trucking remained high throughout the period, the union premium for truckers in the previously regulated for-hire sector of the industry narrowed significantly following deregulation, particularly in the less highly organized South and West regions. Evidence from the unregulated private carrier sector of the industry indicates little narrowing of the union premium.

The evidence is consistent with the view that a large competitive sector existed in both sectors of the trucking industry prior to deregulation. Nonunion truck drivers exhibited real wage rates close to those of similar nontransport operatives both before and after deregulation. While deregulation had significant effects on entry, shipping rates, traffic, firm operating ratios, union wage rates, and the like, the wages of nonunion drivers reflected the opportunity cost of labor, as measured by wage rates outside
of trucking. By contrast, deregulation sharply limited the long-run ability of firms to continue maintenance of costly unionized trucking operations. The significant cost pressures brought to bear upon union wages have produced a narrowing in what was a very large union-nonunion wage differential.

Perhaps the clearest evidence of deregulation's effect on the trucking industry is the sharply declining union density and Teamster organizing strength in recent years. One possible interpretation of this evidence, given the maintenance of a large union wage premium (at least through 1984), is that the Teamsters' concessions were much too little and late to stem the large shift away from union drivers. Indeed, one could argue that any radical change in the economic environment, such as that brought about by trucking deregulation, places strains on a union. Even if union leaders anticipated and fully understood the implications of deregulation, there existed a lag before the rank-and-file shared this realization. Hence, union leaders may not have been able politically to engineer and gain approval of the types of contractual arrangements that would have maintained union organizational strength. An alternative, but not mutually exclusive, interpretation is that union rank-and-file fully understood the implications of trucking deregulation, but that senior members rationally chose to maintain a high-wage strategy in spite of the dire consequences on membership.

References


19. Perhaps the strongest evidence of resistance by rank-and-file to Teamster leadership came in the September 1983 defeat of a national rider to the NMFA that would have created a two-tier wage and benefit structure. The defeat was by a margin of more than seven to one (Perry 1986, 107). Wage discounting for new hires was introduced into many of the 1985 contract agreements.

20. Senior members might be expected to prefer large wage cuts for new hires, rather than moderate cuts for all workers, unless they expect a two-tier system to lead to subsequent across-the-board concessions. For a formal analysis of voting within a collective bargaining framework, see, among others, Blair and Crawford (1984).


