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THE EFFECT OF THE MINIMUM WAGE ON THE FAST-FOOD INDUSTRY

LAWRENCE F. KATZ and ALAN B. KRUEGER*

Using a longitudinal survey of fast-food restaurants in Texas, the authors examine the impact of recent increases in the federal minimum wage on a low-wage labor market. Less than 5% of fast-food restaurants were using the new youth subminimum wage in July/August 1991, even though the vast majority paid a starting wage below the new hourly minimum wage immediately before it became effective. Although some restaurants increased wages beyond the level needed to comply with higher minimum wages in both 1990 and 1991, those federal minimum wage increases greatly compressed the distribution of starting wages in the Texas fast-food industry. Two findings at variance with conventional predictions are that (1) employment increased more in those firms likely to have been most affected by the 1991 minimum wage increase than in other firms and (2) price changes were unrelated to mandated wage changes.

AFTER nearly a decade with no change in the federal minimum wage, legislation increased it from \$3.35 to \$3.80 on April 1, 1990, and increased it again to \$4.25 on April 1, 1991. The amendments to the Fair Labor Standards Act (FLSA) further permitted employers to pay teenage workers a subminimum or "training" wage equal to 85% of the minimum wage. Employers may currently pay teenage

workers as little as \$3.62 per hour for up to 6 months under these subminimum wage provisions. How have these changes to the minimum wage affected the low-wage labor market? This paper examines the impact of recent changes in the federal minimum wage on the fast-food industry.

Five main questions are raised in this paper. First, what is the utilization rate of the teenage subminimum wage? Second, what determines whether a restaurant will utilize the subminimum wage? Third, how has the minimum wage affected wage dispersion? Fourth, what effect has the increase in the minimum wage had on the level of employment at firms affected by the increase? And fifth, how has the minimum wage increase affected the price of fast-food items?

To answer these questions we conducted a longitudinal survey of fast-food restaurants in Texas in December 1990 and July/August 1991. Our choice of that sample reflects two primary consider-

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The data used in this paper will be supplied to other researchers on request to Alan B. Krueger, Department of Economics, Princeton University, Princeton, NJ 08544.

ations. First, the minimum wage is a significant constraint on fast-food establishments. Our survey of Texas fast-food restaurants finds that one-third of restaurants started workers at the minimum wage prior to the April 1990 minimum wage increase, whereas half of restaurants started workers at the minimum wage shortly after the 1990 minimum wage increase, and over three-quarters of restaurants started workers at the minimum wage shortly after the April 1991 increase. Second, the fast-food industry is generally regarded as a highly competitive industry, with little firm attachment and high labor turnover. Thus, the fast-food industry offers a nearly ideal market to test the predictions of the textbook model of the minimum wage.

Texas Fast Food Restaurant Survey Design

To study the impact of recent changes in the minimum wage on a labor market in which we would expect the minimum wage to have a large impact, we conducted a survey of fast-food restaurants in Texas. We selected Texas because it is a large state with relatively many low-paid workers. In 1989, for example, the average hourly wage rate of retail trade workers in Texas was \$5.85, compared to a national average of \$6.52. For teenage workers, the average wage in Texas in 1989 was \$4.19 compared to \$4.61 nationwide, and 37.6% of teenage workers in Texas were paid between \$3.35 and \$3.79 per hour, compared to 25.7% nationwide.¹ Furthermore, Texas does not have a state minimum wage law that would override the FLSA.²

Moreover, the fast-food industry is a

low-wage industry even within retail trade. The industry has lobbied against increases in the minimum wage and has been a staunch supporter of a subminimum wage for youths (Bureau of National Affairs 1985). And the fact that the fast-food industry has extremely high turnover, and hires many first-time workers, makes it likely that fast-food restaurants can take advantage of the youth subminimum.³

Figure 1 outlines the timing of our surveys and the timing of changes in the minimum wage. In 1990 we designed an initial questionnaire to collect retrospective (pre-minimum wage increase) and current information on starting wages, as well as information on the utilization of the new subminimum wage and on non-wage responses to the minimum wage. This survey was administered in December 1990. In 1991 we revised the questionnaire, retaining most of the questions from the original survey, and adding new questions on prices of standard goods at the restaurants and wages of workers already at the firm. The second questionnaire was administered between July 8 and August 2, 1991.⁴

We conducted the survey as follows. We first collected the phone numbers of every Burger King, Wendy's, and Kentucky Fried Chicken outlet listed in the Yellow Pages of the metropolitan phone books for Texas for January 1990.⁵ We then drew a systematic sample consisting of every other phone number listed in the Yellow Pages. When duplicate numbers, disconnected numbers, and wrong numbers were deleted, 294 potential observa-

³ Indeed, Love (1986) estimates that 1 in 15 workers obtained their first job from McDonald's! Although we're not sure whether this estimate is accurate, it is certainly true that many young workers obtain their first job in the fast-food industry.

⁴ Copies of the 1990 and 1991 questionnaires (including mean responses) are available from the authors on request.

⁵ Burger King, Kentucky Fried Chicken, and Wendy's are the second, third, and fourth largest restaurant chains nationwide. We initially intended also to include McDonald's, the nation's largest chain. But because none of the McDonald's restaurants would respond to our pre-test survey, we dropped them from our sample.

¹ We are grateful to David Card for providing us with these statistics. The statistics are based on data from the Current Population Survey.

² The state minimum wage in Texas is \$3.35 per hour, and there is no provision for a subminimum. Therefore, the Texas state minimum wage law is irrelevant for jobs that are covered by the federal minimum wage. In some other states, the state minimum wage is high enough to prevent employers from utilizing the federal youth subminimum wage.

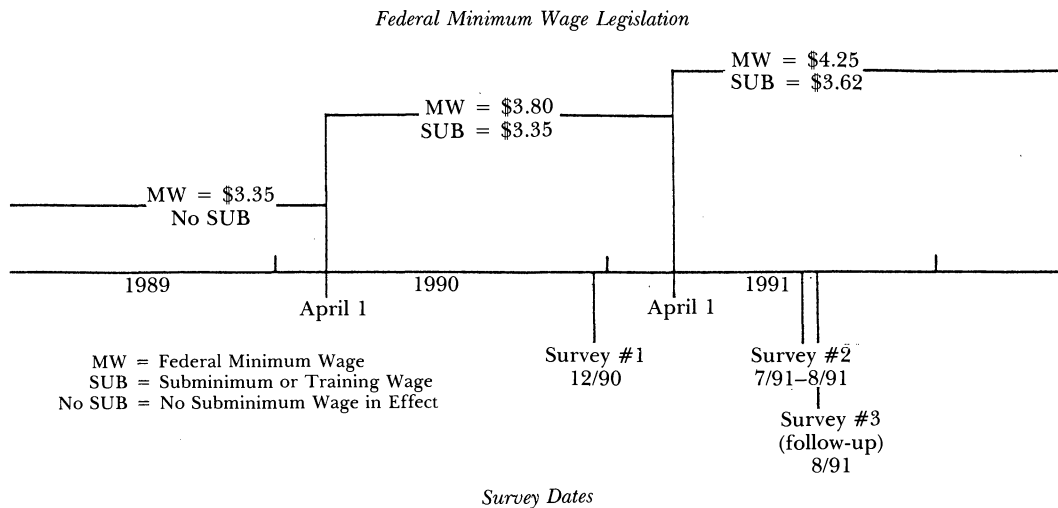


Figure 1. Chronology of Changes in Federal Minimum Wage Legislation and of the Implementation of the Authors' Surveys of Texas Fast-Food Restaurants.

tions remained.⁶ We then attempted to interview the manager or assistant manager of each restaurant by phone between December 12 and December 18, 1990. If a restaurant did not respond on the first call, we called back as many as two times to try to elicit a response. We obtained a total of 167 responses, for a response rate of 57% from the 1990 survey.⁷

For the follow-up survey we attempted to interview *every* restaurant listed in the 1990 phone books for Texas, including those that were originally sampled in 1990 and those that were not. A total of 330 restaurants were interviewed between July and August 1991 in the second wave of the survey; 110 of these firms had been interviewed in the first wave of the survey. The overall response rate in the second wave of the survey was 56%, and the response rate was 66% for the subset of firms that responded in the first wave of

the survey.⁸ We collected additional information about the local labor market in which each restaurant was located (such as the unemployment rate and size of the city) using the *County and City Data Book, 1988*.

To assess the reliability of responses to key questions on the survey, we randomly selected 30 restaurants that responded in the second wave of the survey, and re-interviewed them in August 1991. The sampled firms were asked the same set of questions regarding wages, prices, and employment that they were asked previously. We then calculated the correlation between responses on the original survey and on this re-interview survey. These correlations are an estimate of the ratio of the true variance of the variable to the total reported variance, under the assumption that reporting errors are uncorrelated with each other and with the true variable in each measurement. The correlations were generally in the .70 to .80

⁶ Of the restaurants listed in the phone book, 25 were unreachable because of closings, transcription errors, or some other reason for a disconnection, and 10 were wrong numbers.

⁷ Although there may be some concern about possible differences between respondents and nonrespondents, our tabulations did not reveal any systematic differences between restaurants that responded on the first call and those that required at least one follow-up phone call before responding.

⁸ Restaurants that paid a higher wage in December 1990 were more likely to respond in the second wave of the survey, but the relationship between wage and attrition was statistically insignificant. It may be that low-wage restaurants were somewhat more likely to close because of the increase in the minimum wage.

range. For example, the correlation between the two measurements was .76 for starting pay, .76 for log employment, .65 for the price of french fries, .72 for the price of soda, .85 for the percentage of workers who are black, and .93 for the percentage of workers who are Hispanic.

Table 1 presents a cross-tabulation of the starting wage for part-time workers of sampled restaurants before and after the April 1990 and April 1991 increases in the minimum wage.⁹ The table indicates that 71.4% of these restaurants were compelled to increase their starting wage by the 1990 rise in the minimum wage from \$3.35 to \$3.80. Furthermore, one-third of the restaurants moved their starting wage from exactly the old minimum to exactly the new minimum. In December 1990, 47% of restaurants were starting workers at exactly the minimum wage (\$3.80).

The April 1991 increase in the minimum wage from \$3.80 to \$4.25 had an even larger effect on restaurant wages. Some 95% of restaurants were forced to increase their starting wage by the 1990 increase in the minimum wage, and 75.8% of the restaurants paid new hires exactly the minimum wage (\$4.25) in the summer of 1991. Notice also that the fraction of restaurants that paid exactly the old minimum wage (\$3.80) was slightly higher in July/August 1991 than in December 1990 (47% versus 55.4%). This finding suggests that the low-wage labor market in Texas was slipping before the 1991 higher minimum wage took effect, perhaps due to the onset of the 1991 recession. These tabulations indicate that our survey has identified a universe of employers that is likely to be affected by the minimum

wage, and that has potential to use the youth subminimum wage.

Utilization of the Youth Subminimum Wage

Our initial survey found that a very small percentage of fast-food restaurants took advantage of the teenage subminimum wage provisions (see Katz and Krueger 1991). For example, only 1.8% of fast-food restaurants in our survey used the subminimum wage in December 1990. This estimate is consistent with Freeman, Gray, and Ichniowski's (1981) finding that only 3% of students' work hours were covered by the subminimum wage permitted for full-time students in the late 1970s. The youth subminimum or "training" wage is much easier to use than the full-time student exemption. Notably, the new youth subminimum applies to all teenage workers (not just full-time students), and requires less cumbersome restrictions on employees' hours. Moreover, under the new law, no additional training is required for the first 90 days, and only a minimal amount of training is necessary if the subminimum is to be used for an additional 90 days.

Our second survey finds that utilization of the youth subminimum increased to 4.8% of restaurants in July/August 1991. Interestingly, only 34.1% of managers responded that they were unaware of the subminimum wage law in December 1990, and roughly the same fraction (31.5%) responded that they were unaware of the subminimum in the summer of 1991.

In our initial survey of fast-food restaurants in 1990 we described the subminimum wage law to managers as a preamble to our question on subminimum wage use. Since we interviewed a random sample of restaurants in 1990, and then interviewed a wider sample in 1991, we can test whether informing managers about the existence of the subminimum wage increased the restaurant's awareness of this option. We find no relationship between whether a manager responded that he or she was aware of the subminimum wage law and whether the restaurant was

⁹ We use the wage of part-time workers if the restaurant reports a part-time wage, and the wage of full-time workers if the part-time wage is missing. In 1991, all restaurants in the sample that provided wage information paid the same wage to full- and part-time workers. In April 1990, 97% of restaurants paid the same wage to full- and part-time workers, and in December 1990 the figure was 93%. Table 1 includes information on all the restaurants that provided data on starting wages. In each subsequent table, we use the maximum possible sample of restaurants that have information on all the relevant variables for that table.

Table 1. Cross-Tabulations of Starting Wage Before and After Two Minimum Wage Increases: Fast-Food Restaurants in Texas, 1990 and 1991.

A. Minimum Wage Increase from \$3.35 to \$3.80, April 1, 1990			
Wage Before April 1990	Wage in December 1990		Row Total
	\$3.80	> \$3.80	
\$3.35	52 (31.7%)	8 (4.9%)	60 (36.6%)
(\$3.35, \$3.80)	23 (14.0%)	34 (20.7%)	57 (34.8%)
\$3.80	2 (1.2%)	11 (6.7%)	13 (7.9%)
> \$3.80	0 (0%)	34 (20.7%)	34 (20.7%)
Column Total	77 (47.0%)	87 (53.0%)	164 (100%)

B. Minimum Wage Increase from \$3.80 to \$4.25, April 1, 1991			
Wage Before April 1991	Wage in July/August 1991		Row Total
	\$4.25	> \$4.25	
\$3.80	164 (52.2%)	10 (3.2%)	174 (55.4%)
(\$3.80, \$4.25)	71 (22.6%)	52 (16.6%)	123 (39.2%)
\$4.25	3 (1.0%)	12 (3.8%)	15 (4.8%)
> \$4.25	0 (0%)	2 (0.6%)	2 (0.6%)
Column Total	238 (75.8%)	76 (24.2%)	314 (100%)

Note: This table gives the number of restaurants in each cell, with the percentage of the total underneath in parentheses. One restaurant that reported paying \$3.75 per hour in April 1991 is recorded as paying \$3.80 per hour.

interviewed in our initial survey. We also find that the firms that were included in the initial survey were slightly more likely to use the subminimum wage (5.6%, versus 4.2% of those not included in the initial survey), but this difference is not statistically significant ($t = 0.53$). Thus, informing restaurant managers about the subminimum wage law in 1990 appears to have had no discernible effect on their restaurants' propensity to use the subminimum in 1991.

A possible reason for the slight increase in the utilization of the subminimum wage is that the benefit to employers of using the subminimum wage was greater in 1991 than in 1990. First, the gap between the subminimum wage and the minimum wage was greater in absolute value and in percentage terms in 1991 than it was in

1990.¹⁰ Second, the minimum was likely to be farther above the equilibrium wage in the summer of 1991 than in late 1990. Indeed, our survey results suggest that more workers in Texas would have accepted a fast-food job at a subminimum wage (if offered) in 1991 than in 1990. In 1991, 37.9% of managers of restaurants that were not using the subminimum wage believed they could "attract *qualified* teenage workers at a subminimum wage." In 1990, this figure was just 17.5%.¹¹

¹⁰ Although the subminimum wage is set at 85% of the minimum wage, the subminimum was fixed at \$3.35 (11.8% below the minimum wage) for the first increase in the minimum wage.

¹¹ Another possible reason for this trend is that the supply of teenage employees to fast-food restaurants is likely to be more plentiful in the

In spite of the increase in the percentage of managers who believed they could attract teenage workers at a rate below the minimum wage, even in 1991 the majority of respondents said they believed that they could not attract teenage workers at a rate below the minimum wage. Because 95% of these firms were offering new workers an hourly wage rate below \$4.25 just before the minimum was increased to \$4.25, it is quite surprising that a large majority of respondents believed that they could not attract workers at a subminimum wage. One explanation for this finding is that restaurants were "supply-constrained" when they offered a wage below \$4.25, and thus could not attract enough workers at the former wage. Alternatively, managers may feel that relative pay is important to workers, and that workers will not accept jobs if they are paid less than others doing the same work. Workers may also be unwilling to accept jobs at the subminimum wage if it is easier to search for a job paying the new higher minimum wage from unemployment than from employment.

About 20% of managers at firms that were not using a subminimum wage said they believed it is not fair to use a subminimum wage, and about half of managers who offered a response said they believed that if the subminimum wage could be paid to all workers, not just teenage workers, their restaurant would use the subminimum wage. On the other hand, 23% of managers responded that the difficulty of applying for the subminimum wage is at least one reason why their restaurant did not offer a subminimum wage. This figure is up from 7.3% in 1990. Finally, about one-third of managers who offered a response said that their restaurant would use the subminimum wage if it were easier to administer—for example, if the time limitation or training requirement were eliminated.

To better understand the reasons for the low utilization of the subminimum wage, we have estimated logit models to

predict which restaurants use the subminimum wage. In particular, we are interested in whether the gap between the store's starting wage prior to the minimum wage increase in April 1991 and the new minimum wage (\$4.25) is positively related to the likelihood it uses the subminimum wage. One would expect that firms will find it more attractive to offer a subminimum wage if the minimum wage forces them to raise their wage by a large amount. Our analysis is based on data collected in the 1991 survey. Table 2 summarizes the logit estimates.

The explanatory variables in the logit models are not very successful at explaining utilization of the subminimum wage. For example, the reported chi-square tests of the hypothesis that the independent variables jointly have no effect have probability values ranging from .34 to .02, depending on the model. Nevertheless, some tentative conclusions can be drawn from the logit estimates.

First, although the amount by which a restaurant falls short of the new minimum wage is positively associated with utilization of the subminimum wage, this variable has a statistically insignificant effect. Second, restaurants that have a higher proportion of workers who are Hispanic or black are more likely to utilize the subminimum wage. Moreover, these findings for the proportion of minority workers hold up after we include dummy variables for seven regions of Texas. Third, restaurants that employ a work force consisting of over 90% teenage workers are more likely to use the subminimum wage, but this variable does not have a statistically significant effect.

The Effect of Minimum Wage Increases on Compensation

Table 3 presents averages of several measures of compensation, broken down by whether the restaurant started workers at \$3.80 per hour, between \$3.81 and \$4.24 per hour, or at least \$4.25 per hour just before the minimum wage increase

summer (when the 1991 survey was conducted) than in the winter (when the 1990 survey was conducted).

Table 2. Logit Estimates of Subminimum Wage Utilization.
(Standard Errors in Parentheses)

Variable	(1)	(2)	(3)
Intercept	-3.818 (0.090)	-3.836 (1.266)	-5.868 (1.644)
Gap Between April Wage and \$4.25	2.447 (2.811)	2.125 (2.810)	1.346 (2.780)
Company Owned (1 = Yes)	—	-0.852 (0.643)	-0.764 (0.656)
Wendy's (1 = Yes)	—	-0.814 (1.113)	-0.867 (1.128)
Kentucky Fried Chicken (1 = Yes)	—	1.335 (0.656)	1.153 (0.661)
Proportion of Workers Who Are Hispanic	—	—	3.334 (1.359)
Proportion of Workers Who Are Black	—	—	2.543 (1.455)
Proportion of Teenagers > .90 (1 = Yes)	—	—	0.950 (0.853)
P-value for χ^2	0.344	0.085	0.022

Note: The sample size is 282, and the mean of the dependent variable is .053.

took effect on April 1, 1991. Restaurants that paid the minimum wage (\$3.80) prior to April 1991 increased their starting wage by 12% (46 cents), on average, to just over the new minimum wage (\$4.26), by July/August 1991. In contrast, over the same period, restaurants that were initially above the new minimum wage increased their starting wage by just 4.6% (20 cents), on average.

There are two potential explanations for why firms that were already paying above the new minimum wage increased their starting wage after the minimum wage increased. First, as Grossman (1983) and Akerlof and Yellen (1990) contend, relative wages may influence work effort, so firms already above the minimum wage may adjust their wages to maintain effort levels. Second, it is possible that market

Table 3. Response to the Change in the Minimum Wage by Starting Wage Prior to April 1, 1991.

Description	(1) Starting Pay = \$3.80	(2) Starting Pay Between \$3.80 and \$4.25	(3) Starting Pay ≥ \$4.25
Proportion Using the Youth Subminimum	0.06	0.03	0.06
Average Starting Wage Before April 1, 1991	\$3.80	\$3.93	\$4.28
Increase in Starting Pay from April 1 to December 1991	\$0.46	\$0.37	\$0.20
Proportion Maintaining Wage Hierarchy	0.16	0.33	NA
Proportion with Spillover to Workers Earning \$4.50 per Hr.	0.09	0.29	0.60
Proportion Decreasing Amount of First Pay Raise	0.05	0.03	0.00
Proportion Increasing Time to First Pay Raise	0.03	0.05	0.00
Proportion That Cut Fringe Benefits	0.04	0.04	0.06
Sample Size	174	122	17

Note: The proportion maintaining the wage hierarchy is the proportion of restaurants that after April 1, 1991, paid a wage above the restaurant's new starting wage to workers who prior to April 1, 1991, had earned between the restaurant's starting wage and \$4.25. The proportion with spillover to workers earning \$4.50 per hour is the fraction of restaurants that increased the pay of workers earning \$4.50 once the minimum wage increase took effect.

forces would have led to a small increase in wages in the fast food industry in Texas even in the absence of the minimum wage increase.

In Table 4 we report estimates of regressions of the log of the starting wage on several independent variables, using data from both waves of our survey. The 1990 and 1991 increases in the minimum wage led to a substantial reduction in the dispersion of starting wages across restaurants. For example, the standard deviation of the log wage decreased from .074 in April 1990, to .046 in December 1990, to .032 in April 1991, and to just .022 in July/August 1991.

The decline in wage dispersion is reflected in the wage regression estimates. For example, the regressions show that before April 1990, company-owned restaurants paid a higher starting wage than franchisee-owned restaurants (see also Krueger 1991), and restaurants in areas with a higher unemployment rate had lower wages. Both of these effects, however, decreased substantially after the minimum wage increased to \$3.80 (December 1990), and the coefficients contin-

ued to shrink after the minimum wage increased to \$4.25. Similarly, the Kentucky Fried Chicken chain offered a 6% ($t = 3.5$) higher wage rate than Burger King before April 1990, and this differential was insignificant by July/August 1991. And the differentials in pay across regions of Texas were virtually eliminated by the increases in the minimum wage. For example, before the April 1990 increase in the minimum wage, restaurants in Dallas paid 8% more than restaurants in the Rio Grande area, but this gap became insignificant in July/August 1991.

Our survey also collected information on how within-firm wage policy responded to the increases in the minimum wage. In particular, suppose a firm paid \$3.80 per hour to new workers before April 1990, and then increased its starting wage to \$4.25. What did such a firm do to the pay of incumbent workers whose wages had risen to a rate of, say, \$4.00? Our results indicate that 16% of firms in this situation increased the wage of the worker earning \$4.00 to above the new starting wage, and thus maintained their wage hierarchies; the remainder com-

Table 4. Log Wage Equations for Starting Wages at Various Dates.
(Standard Errors in Parentheses)

Variable	Time Period			
	Before Apr. '90 (1)	Dec. '90 (2)	Before Apr. '91 (3)	Aug. '91 (4)
Intercept	1.199 (0.090)	1.365 (0.063)	1.282 (0.030)	1.425 (0.020)
Company-Owned (1 = Yes)	0.033 (0.013)	0.018 (0.009)	0.007 (0.005)	0.002 (0.003)
Wendy's (1 = Yes)	0.024 (0.014)	0.015 (0.010)	0.011 (0.005)	0.002 (0.003)
Kentucky Fried Chicken (1 = Yes)	0.060 (0.017)	0.023 (0.012)	0.016 (0.006)	0.010 (0.004)
Log Number of Employees	0.001 (0.018)	-0.010 (0.013)	0.008 (0.005)	0.004 (0.004)
City Unemp. Rate in 1986	-0.576 (0.206)	-0.156 (0.143)	-0.143 (0.068)	-0.054 (0.047)
Log Population of City in 1986	0.005 (0.005)	0.002 (0.004)	0.004 (0.002)	0.001 (0.001)
R ²	0.280	0.167	0.100	0.050
Mean Log Wage	1.277	1.369	1.355	1.457
SD of Log Wage	0.072	0.046	0.032	0.022
Sample Size	138	138	287	287

pressed whatever wage differentials existed between long-service workers and new hires. We asked a similar question in the first wave of the survey (for example, what happened to the earnings of someone whose wage rate rose from \$3.35 to \$3.50 once the minimum wage increased to \$3.80?), and found that 41% of restaurants maintained their wage hierarchy. Thus, firms were much more likely to preserve wage differentials between new workers and long-service workers after the 1990 increase in the minimum wage than after the 1991 increase. Less concern for internal equity in 1991 may have resulted because the rise in the minimum wage to \$4.25 is likely to have conferred more rents to infra-marginal workers than the rise to \$3.80.

A related question is whether firms increased the pay of workers who were already earning above \$4.25 an hour before the minimum wage increase took effect. We find that firms were less likely to increase these workers' relative earnings than they were to increase the relative earnings of someone earning between \$3.80 and \$4.25 (see row 5 of Table 3). Not surprisingly, there is less of a spillover effect of the minimum wage increase further up the wage hierarchy.

Finally, we examined whether firms delayed the time until workers receive their first pay raise or reduced the amount of the first raise in response to an increase in the minimum wage. Rows 6 and 7 of Table 3 provide some information on these questions. Although restaurants that were forced to increase their starting wage by the rise in the minimum wage are more likely to delay the first raise they give to workers, and to reduce the amount of the first raise, only a small proportion of firms took these actions. Furthermore, 91% of restaurants offered at least some fringe benefits to workers, and relatively few restaurants reduced fringes.

Employment Effects of the Minimum Wage

We next examine the effects of recent increases in the federal minimum wage on

employment in the Texas fast-food industry. The conventional competitive model of the low-wage labor market predicts that, *ceteris paribus*, a mandated wage increase arising from a change in the minimum wage should reduce employment in affected establishments. We examine this issue by comparing employment growth of establishments classified by the likely degree of impact of minimum wage changes. By comparing employment changes of establishments in one industry and state, we eliminate the effects of industry and state shocks to employment that may be correlated over the period examined with the extent of wage changes induced by the minimum wage. Our methodology is similar to the approach used by the U.S. Department of Labor (1959) and Lester (1964) in earlier establishment-based studies of the employment effects of minimum wage laws.¹²

We first analyze the employment effects of the minimum wage increase from \$3.80 to \$4.25 in April 1991 using the matched sample of establishments that responded to both our December 1990 and July/August 1991 surveys. For 100 establishments, we have complete data on the number of full-time employees, number of part-time employees, and average starting wage for nonmanagement employees both several months before (in December 1990) and several months after (in July/August 1991) the most recent increase in the federal minimum wage. We measure the likely impact of the minimum wage increase on an establishment's level of employment by the proportional increase required in the firm's starting wage for the firm to minimally comply with the new minimum wage of April 1, 1991. The log minimum wage gap is defined as $\max(0, \log(4.25/W))$ where W is the establishment's starting wage for nonmanagement employees in December 1990. The log minimum wage gap ranges from 0.11 (\$0.45 in levels) for firms at the old minimum wage of \$3.80 to 0 for those

¹² See also Cullen (1961) for a thoughtful evaluation of the evidence on minimum wage effects based on the early literature.

already paying at least \$4.25 prior to the most recent minimum wage increase.

Table 5 presents regression estimates of the effects of wage changes mandated by the minimum wage increase of April 1991 on employment growth from December 1990 to July/August 1991 for our sample of matched establishments. The table presents both the OLS estimates of reduced form models linking employment changes directly to the log minimum wage gap, and two stage least squares estimates of models in which the actual change in the log starting wage is instrumented for by the log minimum wage gap. The first two columns present estimates of equations in which the dependent variable is the change in log total employment (with full-time and part-time workers counted equivalently). The reduced form model estimates indicate that, contrary to the predictions of the conventional competitive labor market model, employment growth was positively related to the size of wage increases mandated by the minimum wage.¹³ The instrumental variables estimates in column (2) show a similar story. The estimates of positive minimum wage effects on employment are statistically significant at the 10% level (probability values of approximately 0.07) in both models. The estimates are also moderately large, with an elasticity of 1.70 to 1.85.

Columns (3) and (4) of Table 5 present analogous employment change equations with employment measured in full-time equivalent units (FTEs).¹⁴ The results are

even more striking than those using the total number of employees. Employment in FTEs increased by substantially more in establishments with larger mandated wage increases, and the estimates are highly statistically significant. A 10% mandated wage increase is predicted to raise relative employment in FTEs by approximately 25%. The estimated effects of minimum wage-induced wage changes on employment presented in Table 5 are not very sensitive to the choice of covariates. For example, if we include seven region dummies along with the covariates in column (4) of Table 5, the coefficient on the change in log starting wage is 2.19 with a standard error of 1.10.¹⁵

The positive relationship between the wage increase required by the new minimum wage and change in employment is displayed in a scatter diagram in Figure 2. Although some outliers are apparent, the figure illustrates that log employment growth in FTEs was higher on average in establishments with large minimum wage gaps (\$0.45) in December 1990 than in those with starting wages at or above \$4.25. Average log employment growth varied from $-.168$ ($n = 11$) for establishments with wages of \$4.25 or higher in December 1990, to $.058$ ($n = 23$) for establishments paying exactly \$4.00 initially, to $.168$ ($n = 40$) for those paying the old minimum wage of \$3.80 initially. The corresponding median values for employment growth are 0, .05, and .15, respectively.

Because of concern over the possible effects of outliers, we have estimated the employment growth models by minimizing the sum of absolute deviations (LAD), in addition to the OLS estimates. The

¹³ At the suggestion of a referee, we also estimated specifications that included the proportionate gap between the minimum wage and the restaurant's starting wage just prior to the April 1990 increase in the minimum wage (that is, the proportionate increase to reach \$3.80). This new variable could be thought of as a lag of the minimum wage gap that we have included. The log minimum wage gap was highly correlated in both periods. Nevertheless, both log minimum wage gaps were estimated to have a positive effect if they were included together in the model, and the coefficient was larger for the December 1991 log wage gap.

¹⁴ The number of full-time equivalents equals the number of full-time employees plus 0.57 times the number of part-time employees. This definition is based on our tabulations of data from the 1982–83

survey of employees in the fast-food industry conducted by the National Institute for Work and Learning (NIWL). We find in this data a ratio of average weekly hours of part-time employees to those of full-time employees of 0.57. See Charner and Fraser (1984) for a discussion of the NIWL survey.

¹⁵ One could argue that region dummy variables should be included to capture possible correlations between local labor market shocks during our sample period and initial wage levels.

Table 5. Regressions of Employment Changes on Wage Changes Mandated by the Increase in the Federal Minimum Wage of April 1991.
(Standard Errors in Parentheses)

Variable	Change in Log Employment (Dec. '90–Aug. '91)		Change in Log FTE Employment (Dec. '90–Aug. '91)	
	(1) Reduced Form	(2) 2SLS ^a	(3) Reduced Form	(4) 2SLS ^a
Intercept	0.087 (0.372)	0.190 (0.366)	-0.198 (0.396)	-0.051 (0.392)
Change in Log Starting Wage ^b	—	1.734 (0.934)	—	2.478 (1.001)
Log Min. Wage Gap ^c	1.850 (0.997)	—	2.643 (1.062)	—
Company Owned (1 = Yes)	-0.051 (0.089)	-0.048 (0.090)	-0.034 (0.095)	0.029 (0.096)
Burger King (1 = Yes)	0.003 (0.094)	0.017 (0.093)	-0.056 (0.101)	-0.036 (0.100)
Kentucky Fried Chicken (1 = Yes)	0.113 (0.108)	0.089 (0.109)	0.034 (0.115)	-0.000 (0.117)
Log Population of City in 1986	-0.018 (0.029)	-0.026 (0.029)	0.007 (0.030)	-0.005 (0.031)
R ²	0.055	—	0.067	—
S.E. of Regression	0.363	0.363	0.387	0.389
Sample Size	100	100	100	100

Note: The number of full-time equivalents equals full-time employees plus 0.57 times the number of part-time employees. Reduced form models are estimated by OLS.

^a The log minimum wage gap is used as an instrument for the change in the log starting wage.

^b Change in log starting wage of nonmanagerial employees from December 1990 to July/August 1991.

^c The log minimum wage gap equals $\max(0, \log(4.25/W))$ where W is the starting wage for nonmanagerial employees in December 1990.

LAD estimates of the employment effects of wage increases are smaller than the OLS estimates but still positive. For example, the coefficient on the log minimum wage gap is 1.16 with a standard error of .55 if the model in column (3) of Table 5 is by LAD instead of by OLS.¹⁶ This finding suggests that our positive employment effect is not merely a result of undue influence from outliers.

The estimated positive effects of wage changes on employment are larger if employment is measured by FTEs than if it is measured by the total number of workers, implying that the share of total employment accounted for by full-time employees increased in establishments with large mandated wage increases relative to other establishments. This finding

suggests that minimum wage increases induced firms to substitute full-time for part-time employees. In fact, the overall level of total employment per establishment in our entire survey samples remained fairly stable from December 1990 to July/August 1991, but full-time employment per establishment increased from 6.91 to 8.91 and part-time employment per establishment fell from 15.41 to 12.89.¹⁷

Two caveats should be noted in interpreting our finding of a positive effect of the higher minimum wage on employ-

¹⁶ The standard error was estimated by bootstrapping the model, using 50 replications.

¹⁷ We note, however, that seasonality in full-time employment may also account for the relative increase in full-time employment between December 1990 and August 1991. Seasonality will not influence our estimates of the minimum wage effect in Table 5 because seasonal demand fluctuations are likely to affect equally restaurants with different initial wage levels.

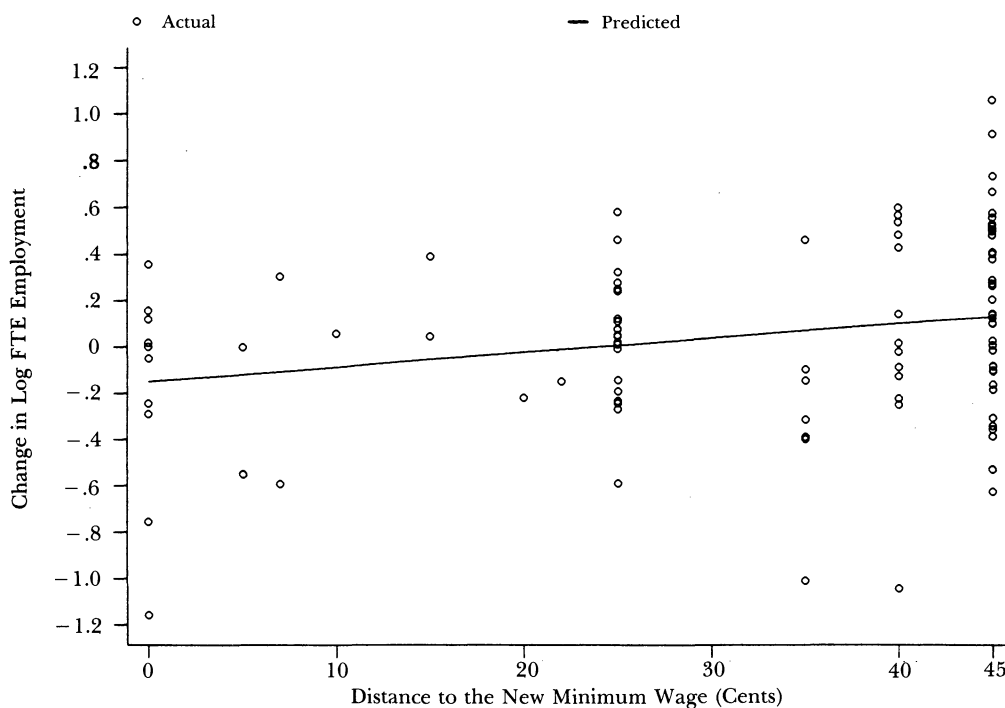


Figure 2. Employment Effects of the April 1, 1991, Minimum Wage Increase on Texas Fast-Food Restaurants: Changes in Full-Time Equivalent Employees (FTEs) Plotted Against the Difference Between the New Minimum Wage and the Establishment's Wage Rate Prior to the Effective Date of the New Minimum Wage Law.

ment in the fast-food industry. First, our sample is limited to restaurants that were in operation before and after the minimum wage increased. It is possible that the higher minimum wage caused restaurants to close, thereby reducing total employment in the industry. Further, the rate of formation of new restaurants might have slowed down because of the minimum wage. Both of these forces might have caused employment to grow at the restaurants that remained in operation. Second, although our estimated coefficients for the wage variable in the employment equations are statistically significant, they have relatively large standard errors.

These caveats aside, a model in which the employers of low-wage workers are assumed to have market power and act as monopsonistic buyers of labor (Stigler 1946; Sullivan 1989) is potentially consistent with the findings presented in Table 5 and Figure 2. In the standard monopsony

model, a binding minimum wage can increase both employment and wages. Our estimates in Table 5 are consistent with a model of monopsony with an elasticity of supply of labor to individual fast-food restaurants ranging from 1.70 to 2.65. These elasticities indicate a substantial amount of monopsony power in the short run (over an eight-month period).

A possible interpretation of this type of monopsony model is that low-wage employers have some degree of monopsony power over their existing employees and do not increase wages to attract additional outside employees because internal equity concerns essentially require them to raise the wages of all existing employees to the level of wages of new recruits. The cost of raising the wages of infra-marginal workers outweighs the benefits of attracting new employees with higher starting wages. The responses to both of our surveys of Texas fast-food restaurants indicate much

employer concern with the fairness of the internal wage structure. The same equity concerns that appear to make establishments reluctant to use the subminimum wage may make them reluctant to raise wages when they have some monopsony power over a subset of workers. A potential problem with this monopsony interpretation of our employment findings is that a large degree of monopsony power seems somewhat implausible in the high-turnover labor market of the fast-food industry.

Our failure to find conventional negative effects of minimum wage increases on employment is consistent with earlier research using establishment data. Lester (1964:507–27) reviewed a series of studies of the effects of the minimum wage increase of March 1, 1956 (from \$0.75 to \$1.00) on employment changes in establishments in low-wage industries and regions. These studies compared employment growth in specific industries and regions among establishments classified by the percentage increase in average hourly wages mandated by the change in the law. The studies show a wide range of patterns of employment changes classified by minimum wage impact. Lester concluded, “The statistics . . . do not lend much support to the notion that a forced increase in the minimum wage will soon lead to a reduction in a firm’s employment in proportion to the relative size of the wage increase” (pp. 523–24).

More recently, Card (1991) examined the effect of a substantial increase in the state minimum wage in California (from \$3.35 to \$4.25). He found that the employment rate of teenagers in California increased both absolutely and relative to the employment rate of teenagers in other “comparable” states after the minimum wage increase took effect.¹⁸ Thus, we conclude that studies based on cross-section comparisons of changes in employ-

ment of affected and unaffected groups from changes in minimum wage laws in the United States do not seem to find the conventional negative employment effects apparent from many time-series studies (such as Brown, Gilroy, and Kohen 1983).¹⁹ Future work should attempt to reconcile the different findings from these alternative methodologies.

Further information on employment changes is available from our two surveys of Texas fast-food establishments. In the first survey on the effects of the minimum wage increase of April 1990, we asked each firm whether the number of workers on a shift or the number of shifts per day was reduced because of the minimum wage increase. We find little difference in responses between those directly constrained by the minimum wage increase and those already paying starting wages above the new minimum wage prior to April 1990. The vast majority of constrained and unconstrained firms reported that employment was not affected by the minimum wage increase. We asked a similar question in our July/August 1991 survey of the effects of the April 1991 minimum wage increase. In this case, the responses lend slight support to the conventional model: 10.5% of firms constrained by the new minimum (those previously paying under \$4.25) responded that they had reduced the number of nonmanagement workers on a shift since April 1, 1991, whereas 6% of firms initially paying an hourly wage of \$4.25 or above responded that they had reduced employment since April 1, 1991.

We conclude that our surveys provide little evidence of significant adverse effects of minimum wage increases on employment. Direct measures of employment and wages at the survey dates indicate that employment increased substantially more rapidly from December 1990 to July/

¹⁸ Card (“Using Regional Variation in Wages . . .,” this issue) similarly fails to find conventional negative employment effects of the 1990 federal minimum wage increase in an analysis that uses regional variation in the likely impact of the increase on the low-wage labor market.

¹⁹ A comparison of employment changes across industries by the likely degree of impact of the minimum wage does seem to follow the negative correlation predicted by a standard competitive model for the large increases in the minimum wage in Puerto Rico studied by Castillo-Freeman and Freeman (1992).

Table 6. Two Stage Least Squares Estimates of Price Change Equations.
(Standard Errors in Parentheses)

Variable	Change in Log Price from January 1 to July/August 1991			
	(1) Full Meal ^a	(2) Soda	(3) Fries	(4) Main Course ^a
Intercept	0.092 (0.372)	0.118 (0.224)	0.164 (0.040)	0.038 (0.038)
Change in Log Starting Wage ^b	-0.089 (0.133)	-0.129 (0.224)	-0.367 (0.204)	0.121 (0.196)
Company Owned (1 = Yes)	-0.014 (0.006)	-0.033 (0.010)	0.001 (0.009)	-0.003 (0.008)
Burger King (1 = Yes)	-0.001 (0.006)	-0.017 (0.011)	0.006 (0.010)	0.020 (0.010)
Kentucky Fried Chicken (1 = Yes)	0.009 (0.007)	0.002 (0.011)	0.003 (0.010)	0.024 (0.010)
Log Population of City in 1986	-0.003 (0.002)	-0.004 (0.003)	-0.007 (0.003)	0.000 (0.003)
7 Region Dummies	Yes	Yes	Yes	Yes
S.E. of Regression	0.038	0.064	0.058	0.056
Sample Size	266	266	266	266

Note: All models are estimated by two stage least squares.

^a A full meal consists of a soda, french fries, and a main course. A main course consists of a basic hamburger at Burger King and Wendy's, or six pieces of chicken at Kentucky Fried Chicken.

^b Change in log starting wage of nonmanagerial employees from April 1991 to July/August 1991. This variable is treated as endogenous and instrumented for using the log minimum wage gap. The log minimum wage gap equals $\max(0, \log(4.25/W))$ where W is the starting wage for nonmanagerial employees prior to April 1991.

August 1991 in firms where the minimum wage increase of April 1991 had a substantial bite than in firms less constrained by the minimum wage increase. Establishment responses to questions concerning the direction of changes in employment of nonmanagement employees lead to more ambiguous findings.

Price Effects of the Minimum Wage

The final issue we examine using our survey data is the effect of the April 1991 minimum wage increase on the prices of meals at fast food restaurants. The conventional model of the effect of a binding minimum wage implies an increase in labor costs should translate into an increase in product prices. To a first order approximation, the increase in price should be proportional to minimum-wage labor's share of factor costs. In contrast, some monopsony models predict that a small increase in the minimum wage will increase industry employment and output and reduce industry product prices.

In our survey of July/August 1991, we asked about the prices of three standard items at each restaurant: a medium soda, a small order of french fries, and a main course. The main course was a basic hamburger at restaurants in the Burger King and Wendy's chains, and six pieces of chicken in the Kentucky Fried Chicken chain. The survey included questions about both current prices, time since the last price change, and the price in January 1991.

Table 6 presents estimates of the effects of wage changes induced by the April 1991 increase in the minimum wage on the prices of a full meal, soda, french fries, and a main course.²⁰ The dependent variable in each model is the log price change from January to July/August 1991 of the relevant item. Each equation is estimated by two stage least squares, with the change in log starting wage treated as endogenous and instrumented for by the

²⁰ A full meal, for our purposes, consists of a soda, french fries, and a main course.

log minimum wage gap measured prior to April 1, 1991. The table provides little evidence of relative price increases in those establishments with larger mandated wage increases. The results indicate that the price of a full mean tended to decline in restaurants with large mandated wage increases relative to restaurants not much affected by the minimum wage change. The price effects are not large and are fairly imprecisely estimated. The reported equations include region dummies to control for local demand shocks. The basic results are not very different (small and insignificant price effects) when the region dummies or the other covariates are omitted from the models.

Conclusion

Several tentative conclusions can be drawn from our analysis. First, it appears that relatively few employers use the youth subminimum wage, even in an industry where many employers could probably readily attract teenage workers at a subminimum wage. The subminimum training wage program is experimental and due to expire on April 1, 1993. Since only a small minority of employers has taken advantage of the subminimum wage, we see little grounds for strong support of, or opposition to, the subminimum wage. Second, we have found evidence that several fast-food restaurants increased wages for workers by an amount exceeding that necessary to comply with the higher minimum wage in 1990. However, there was less of a spillover of the minimum wage to other wages after the 1991 increase in the minimum wage than after the 1990 increase.

Finally, the evidence on employment

and price changes does not seem consistent with a conventional view of the effects of increases in a binding minimum wage. Our results indicate that employment increased at firms most affected by the minimum wage increase, and price changes appear to be unrelated to changes in wages resulting from the minimum wage increase. Of course, larger increases in the minimum wage may well result in employment decreases and price increases. Indeed, Castillo-Freeman and Freeman (1992) find that the relatively high minimum wage in Puerto Rico has resulted in substantial employment losses. Under certain conditions, monopsony models predict that a small increase in the minimum wage leads to an increase in employment, whereas a large increase in the minimum wage leads to a decrease in employment.

The behavior that we have documented in this article seems difficult to explain with the standard model that economists use to evaluate the impact of a minimum wage. It would be useful to know if our empirical findings hold up in other establishment-based analyses of the impact of the minimum wage.²¹ Finally, since our analysis is based on a subset of employers that remained in continuous operation before and after an increase in the minimum wage, it would be useful to investigate whether increases in the minimum wage lead to an increase in the failure rate of existing firms and a reduction in the birth rate of new firms.

²¹ We note that a preliminary analysis of a new data set on restaurants in Mississippi and North Carolina by Spriggs, Swinton, and Simmons (1992) finds results generally similar to ours.

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