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ABSTRACT

A study used individual-level data from the National Longitudinal Study of Youth to examine the effects of changes in the federal minimum wage on teenage employment. Individuals in the sample were classified as either likely or unlikely to be affected by these increases in the federal minimum wage on the basis of their wage rates and industry of employment. An estimation, concentrated on teenagers, showed that workers whose wages were between the old and new minimum wage and whose wages were raised by the increase in the minimum were 3-4 percent more likely to lose their jobs in the following year than individuals not directly affected. Even after controlling for the differences among teenage workers, the study concluded that the simple fact of working at a wage below the new minimum raised the probability of unemployment. (YLB)

EMPLOYMENT POLICIES INSTITUTE

THE MINIMUM WAGE AND THE EMPLOYMENT OF TEENAGERS

RECENT RESEARCH

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This paper builds on a working paper of the authors, *A Note on the New Minimum Wage Research*. The authors are grateful to Nancy Cole for excellent research assistance

Executive Summary

The focus on minimum wages has regularly addressed its effects on total employment. In this paper Bruce Fallick and Janet Currie extend our understanding of the minimum wage by focusing on the actual employment histories of individuals instead of relying on aggregate employment data. They address a question that is in many ways more important than overall employment effects: are the *individuals* working at or near the minimum wage at the time of an increase at an increased risk of losing their jobs?

Fallick and Currie work with the National Longitudinal Survey of Youth—a survey which has followed over 11,000 individuals since 1979. The panel-nature of this data set—repeated observations on the same individuals over a series of years—allows them to control for differences among individuals which might otherwise bias the results.

Their estimation, concentrated on teenagers, shows that workers whose wages were between the old and new minimum wage, and whose wages therefore were raised by the increase in the minimum, were 3 to 4 percent more likely to lose their jobs in the following year than individuals not directly affected.

Even after controlling for the differences among teenage workers, Currie and Fallick conclude that the simple fact of working at a wage below the new minimum raised the probability of unemployment.

The study cannot by its nature address the question of whether higher minimum wages reduce or create jobs. The unemployed low wage worker may very well be replaced by another worker with higher skill levels. Nevertheless, it does call into question the usefulness of raising the minimum wage as an anti-poverty measure when it is the lowest paid who are most likely to lose their jobs.

Carlos Bonilla
Employment Policies Institute

The evidence from the 1970s and early 1980s indicated that a 10 percent increase in the minimum wage was associated with a decrease in teenage employment of between 1 and 3 percent. This research, predominantly based on time-series data, led the Minimum Wage Study Commission to conclude in its final report that there was indeed a negative relationship between higher minimum wages and teen employment.

Despite the acceptance of this research, it has long been recognized that inferences drawn from reliance on aggregate time series data — data on *national* employment levels — suffered from several shortcomings. Perhaps the most serious of these was the inherent inability to separate the effects of changes in the federal minimum wage from the effects of other changes in the U.S. economy which occurred at about the same time. Changes in observed employment in response to increases in the federal minimum wage proved difficult to isolate from changes in employment resulting from macroeconomic performance or from the actions of individual states.

These difficulties prompted several authors to undertake new research relying on new data sources. Lawrence Katz and Alan Krueger based their joint work on observations of Texas fast food restaurants over an eight month period spanning the 1990 minimum wage increase. They found no negative relationship between higher minimum wages and employment. Similarly, David Card worked with panel data at the state level and also failed to find the negative relationship between minimum wages and employment. In contrast, David Neumark and William Wascher, also relying on state-level panel data, found a negative relationship between minimum wages and employment.

Since the methodology in our paper is closest in spirit to that in the Card papers, it is worth exploring his methodology and findings in slightly more detail.

In the first study, Card (1992a) exploited the fact that because of regional variation in wage distributions and state minimum wage laws, teenagers in different parts of the country had different probabilities of being affected by the increases in the federal minimum that took effect in 1990. If the minimum wage affected employment levels, then regions with fewer teenagers earning less than the new minimum wage could be expected to exhibit a smaller labor market response than regions with more teenagers below the new minimum. Comparing states with a large number of workers likely to be affected to those with a small number of such workers, Card found that the increase in the federal minimum had no effect on teenage employment.

While Card's use of state-level data surely alleviates the problem of distinguishing the effects of the minimum wage change from other, coincident events in the economy, it may not eliminate the problem completely.

In a similar vein, Card (1992b) compared the experience in California, which raised its minimum wage in 1988, to the experience of states which did not raise the minimum wage, and again found that the increase in the state minimum did not decrease the employment of teenagers.

While Card's use of state-level data[1] surely alleviates the problem of distinguishing the effects of the minimum wage change from other, coincident events in the economy, it may not eliminate the problem completely. Other economic developments or characteristics may vary from state to state in

1 As noted, Neumark and Wascher also used state-level data. The present evidence that the discrepancy between their results and Card's may be due to the fact that Card's methodology does not allow for lagged minimum wage effects. However, we are troubled by Neumark and Wascher's reliance on a "real" minimum wage variable, constructed using mean hourly wage of all workers in the state as a deflator. Currie and Fallick (1992a) found estimated effects of the minimum wage to be discouragingly sensitive to the choice of deflator.

ways which may overwhelm the effect of a minimum wage change. If California was experiencing an independent boom in teenage employment at the time its minimum wage was increased, a boom which other states did not share, then the response to the minimum wage increase there would not predict the effect in other states.

In our work,[2] we sought to avoid this problem by disaggregating even further. Rather than relying on state-level aggregate employment data, we used individual-level data from the National Longitudinal Survey of Youth. The National Longitudinal Survey of Youth (NLSY) started in 1979 with 12,686 young people between the ages of 14 and 21. They have been resurveyed every year since. At each interview, they are asked whether they are currently employed, and their wage on that current job.[3] Working with the individual's actual employment history avoids the problems of both aggregate time-series and cross-section data. We can make direct observations on the work histories of individuals and identify any changes in their work patterns induced by changes in the minimum wage.

We used individual-level data from the National Longitudinal Survey of Youth. The National Longitudinal Survey of Youth (NLSY) started in 1979 with 12,686 young people between the ages of 14 and 21.

The NLSY data do not allow us to examine the effects of the most recent changes in the federal minimum wage on teenage employment; thus we are restricted to analyzing the increases from $2.90 per hour to $3.10 per hour in January 1980, and from $3.10 to $3.35 one year later, rather than the increases from $3.35 to $3.80 in April 1990 and to $4.25 in April 1991. Our sample uses information from 1979 to 1987.

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2 This paper builds on work in Currie and Fallick, "A Note on the New Minimum Wage Research," manuscript UCLA, November 1992b.

3 These questions are similar to those asked in the Current Population Survey, the source of most reports on employment and unemployment.

In an experiment analogous to the one carried out by David Card, we classified individuals in our sample as either likely or unlikely to be affected by these increases in the federal minimum wage on the basis of their wage rates and industry of employment.[4] Individuals with earnings between the new minimum and old minimum wage, who were not employed by state or local governments or engaged in agriculture or domestic services, were classified as likely to be affected — they were "bound" by the increase in the minimum. Remaining individuals were deemed not likely to be affected by the increased minimum.

In an experiment analogous to the one carried out by David Card, we classified individuals in our sample as either likely or unlikely to be affected by these increases in the federal minimum wage on the basis of their wage rates and industry of employment.

We then asked whether individuals in the bound group who were employed in the year prior to an increase in the federal minimum wage were less likely than otherwise similar individuals in the second group to be employed a year later. We used the panel aspect of the data to account for the possibility that the two groups differ in unmeasured ways. Most importantly, the first group is made up exclusively of teenagers with "low wage" jobs, while the second is dominated by teenagers with better jobs. By following the same individuals over several years, we could control for the possibility that these are simply two different "sorts" of people with different levels of job stability.

Table 1 describes the data from the NLSY. The first column shows statistics for all of the cross sections pooled together over the 1979 to 1987 interval. This yields 62,397 observations with wage data representing 11,607 different individuals. The next two columns show statistics separately for people who had a wage observation in either 1979 or 1980. These are workers who had the potential to be affected by changes in the minimum. The last column is provided for reference pur-

4 In fact, we went further and constructed a measure of how affected an individual was likely to be. See below.

poses and describes those individuals who had a wage observation in 1987. Intervening years are omitted from this table but are available directly from the authors.

The first row of the table shows that of the 12,686 people included in the survey, only 3,805 (30 percent) had valid wage data in 1979, a percentage which rose over time as the sample aged and formed stronger attachments to the workforce.[5]

Row 2 shows that a small fraction of those who were employed in the current ("base") year could not have their employment status verified a year later. On examining the data, we suspect that the majority of these people were not employed. However, the estimation results were quite similar whether we deleted persons with missing data from the sample, or assumed that those with missing data were in fact not employed. Employment ratios based on these two definitions are shown in rows 3 and 4.

Row 5 shows the changes in the federal minimum wage between 1979 and 1980 and between 1980 and 1981, while row 6 shows the percentage of our respondents who were bound by these changes. Observations with reported hourly wages of less than $1 or greater than $50 were excluded from the sample, as most of these reports appeared to reflect measurement error. By our measure, 22 percent of the sample was bound by the 1980 increase, while 21 percent of the sample was bound by the 1981 increase, reported in row 6.

Among those who were bound by the increased minimum, the average difference between their old hourly wage and the new minimum was $0.15 in 1979 and $0.18 in 1980, shown in row 7 and referred to as the wage gap.

Row 8 reports the average wage for all individuals in the sample whether or not they were bound by the minimum and whether or not they reported any earnings. Note that

5 The original 12,686 respondents included 1,280 people enlisted in the armed forces. After 1984, all but 201 of these respondents were dropped from the sample, leaving 11,607 people.

Table 1
Means of Key Variables

	Base Year	1979-1987	1979	1980	1987
1	Number of observations with wage data in base year	62,397	3,805	4,859	7,875
2	Number of obervations with wage data in base year and missing values in subsequent year	2,341	162	86	281
3.	Employment ratio in susequent year: obervations with missing values excluded from sample	93%	79%	78%	97%
4	Employment ratio in subsequent year: observations with missing values considered unemployed	89%	75%	77%	93%
5	Change in minimum wage, base year to subsequent year	na	20¢	25¢	0¢
6	Percent of sample earning less than subsequent year's minimum wage -- those "bound" by the minimum wage increase	3%	22%	21%	0%
7	Average wage gap, difference between earnings and subsequent year minimum wage, for workers bound by the minimum wage	17¢ (0.07)	15¢ (0.07)	18¢ (0.08)	na
8	Average wage in base year: All workers	$5.63 (3.34)	$3.61 (1.79)	$4.13 (2.13)	$7.59 (4.46)
9	Change in average, base year to subsequent year (persons with earnings in base and subsequent years)	64¢ (2.90)	70¢ (2.04)	69¢ (2.31)	82¢ (3.81)
10	Percent change in average, base year to subsequent year (persons with earnings in base and subsequent years)	24% (0.86)	30% (0.73)	27% (0.70)	23% (0.84)
	Number of Independent IDs	11,607	na	na	na
	Sample Size	na	12,686	12,686	11,607

Note: Standard errors in parentheses

the "wage gap" reported in row 7 represents about 4 percent of the average base wage in each year. The wage gap was set to zero for those who were not bound by the new minimum.

Note that individuals reporting earnings in two consecutive years experienced wage growth above the growth in the sample averages for the two years. For example, individuals with earnings in both 1979 and 1980 had an average wage gain of 70 cents per hour while the wage for the sample reporting earnings in either year rose by only 52 cents an hour over that same period ($4.13-$3.61, row 8).

Table 2
Distribution of Demographic Characteristics

Base Year	1979-1987	1979	1980	1987
Percent of sample below the poverty line	25%	20%	22%	27%
Percent African-American	22%	18%	19%	24%
Percent Hispanic	16%	15%	16%	16%
Percent Male	53%	53%	53%	52%
Average age in 1979	17.92 (2.25)	18.87 (1.72)	18.47 (2.03)	17.62 (2.27)
High School graduate in 1979	39%	53%	46%	34%

Note. Standard errors in parentheses

Finally, rows 9 and 10 report the average change in the wage base from the base year to the next for just those individuals who reported earnings in both the base and subsequent years.

Table 2 describes characteristics of respondents for which we controlled in our estimation procedures. The numbers reflect the fact that the NLSY over-sampled poor respondents, African-Americans, and Hispanics in order to make more reliable inferences on these groups.

Estimation Results

Table 3 shows selected estimates of the effect of the minimum wage changes on the probability that individuals employed prior to the change were employed as of the next interview date. In addition to the variables shown earlier in Table 1, we controlled for possible business cycle effects and for the aging of the sample by including year dummies. For the estimates shown, the sample was restricted to individuals who had at least 4 observations with wage data in the base year and non-missing employment data in the next year. This was done in order to ensure that there are enough observations per person to fruitfully utilize the panel nature of the data.[6]

6 Currie and Fallick (1992b) includes estimates using the full sample.

Table 3

Effect of Minimum Wage Changes on Employment Probability

	OLS	RE	FE
Intercept	.948	.791	na
	(.010)	(.010)	
Wage gap	-.193	-.190	-.184
	(.034)	(.033)	(.032)
Poverty sample	-.018	-.018	na
	(.002)	(.002)	
Age in 1979	-.000	.000	na
	(6.001)	(.001)	
High School graduate in 1979	.028	.028	na
	(.003)	(.003)	
Male	.027	.027	na
	(.002)	(.002)	
African-American	-.016	-.016	na
	(.002)	(.003)	
Hispanic	-.002	-.002	na
	(.003)	(.003)	
Year Effects			
1979	-.169	-.167	-.162
	(.005)	(.005)	(.004)
1980	-.169	-.172	-.178
	(.004)	(.004)	(.004)
1981	.010	.005	-.009
	(.004)	(.004)	(.004)
1982	-.028	-.026	-.024
	(.004)	(.004)	(.003)
1983	-.015	-.016	-.018
	(.004)	(.004)	(.003)
1984	-.000	-.001	-.004
	(.004)	(.004)	(.003)
1985	-.002	.002	.003
	(.004)	(.004)	(.003)
1986	-.003	-.002	-.001
	(.004)	(.004)	(.003)
Sigma	na	.003	na
R-squared	.074	.075	.077
# of observations	57,508	57,508	57,508

Note: Standard errors in parentheses

Column 1 shows Ordinary Least Squares (OLS) estimates, i.e., a linear probability model. In that regression we see that the coefficient on the Wage Gap variable is -0.193. That is to say, the larger the difference between an individual's earnings and the level of the increased minimum wage the greater is the probability that the person was not employed in the following year. Multiplying this coefficient by the wage gaps we reported for 1979 (15¢) and 1980 (18¢) yields an estimate of the effect on an individual's probability of continued employment. An individual directly affected by the minimum wage increase was 3 to 4 percent less likely to be at work in the year following 1979-1980 round of minimum wage increases than similar individuals with initial wages above the minimum. The larger the wage gap—the closer an individual's wages are to the existing minimum wage—the greater the probability that there will be a loss of employment. Individuals with wages closest to the old minimum wage, those who stood to gain the most from an increase, stood the greatest chance of not being employed in the year following the increase.

An individual directly affected by the minimum wage increase was 3 to 4 percent less likely to be at work in the year following 1979-1980 round of minimum wage increases than similar individuals with initial wages above the minimum.

The least squares estimates presented in column 1 cannot take advantage of the panel-nature of the data. Estimation techniques which do so are presented in columns 2 and 3. Column 2 shows a random effects (RE) model and column 3 shows a fixed effects (FE) model, both in the context of a linear probability model. The RE model assumes that the error terms of repeated observations on a particular individual may be correlated because they share an individual-specific unobserved component. This component, however, is assumed to be uncorrelated with the other explanatory variables. The FE model does not assume that the individual-

specific unobserved component is uncorrelated with the other explanatory variables, but has the drawback that the estimator ignores all of the "between" individual variation in the data. The table indicates that the RE and FE models yield similar estimates, which are in turn very similar to the OLS estimate.[7]

Conclusion

The conventional wisdom associated an increase in the minimum wage with a decline in teenage employment. Our estimate of a significant disemployment effect from the minimum wage is consistent with this view. However, our estimates stand in contrast to Card's results. We believe that the use of individual-level panel data makes our results more compelling.

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Two other differences between this report and those by Card should be considered when comparing the results. First, our method addressed only the possible effects of the minimum wage on movements out of employment. We did not address movement *into* employment. Research based on analysis of overall employment levels implicitly addresses both. However, this would explain the discrepancy in results only if an increase in the minimum wage were to increase both the flows out of and into employment, which we consider unlikely. Even if the movements into and out of employment were to offset each other, a significant policy issue would remain: are the individuals who experience unemployment as a result of the minimum wage increase replaced by individuals with similar backgrounds or are they replaced by individuals with greater skills who now find a given job attractive enough to compete for given the higher

7 Currie and Fallick (1992b) also discuss probit estimates of both the RE and FE models. Several tests of the robustness of the results using alternative sample definitions and a dummy variable for "bound" instead of "wage gap" are also reported.

wage? In the former case, it can be argued that, on the whole, no great harm is done: jobs are merely shuffled among similar individuals resulting only in a change in the distribution of work force tenure. In the latter case, however, individuals working at the minimum at the time of an increase could find themselves crowded out of the labor market, at least until such time as the real value of the minimum wage falls.

The second point is that our data spanned the years 1979 to 1987, and so examine the increases in the minimum wage which occurred January 1980 and 1981. In contrast, Card examined the increase in the federal minimum wage in 1990 and the 1988 increase in the California minimum wage. Consequently, *if* the effects of the minimum wage have changed over the years, then the differences in the time period, rather than the differences in the data and method, may be responsible for the difference in the findings. If there has not been a shift in the effect of the minimum wage then we feel that the estimates based on individual panel level data provide a more reliable measure of those effects.

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