Economic Policy Institute

Briefing Paper

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THE SKY HASN'T FALLEN

An Evaluation of the Minimum-Wage Increase

By Jared Bernstein and John Schmitt

In the summer of 1996, Congress voted to increase the federal minimum wage from $4.25 to $5.15 per hour. On August 20, 1996, President Clinton signed the legislation, which implemented the increase in two stages: a $0.50 per hour increase on October 1, 1996, followed by a $0.40 increase on September 1, 1997. Supporters argued that the bill would raise the earnings of millions of low-wage workers and primarily benefit the poorest working families. Opponents claimed that the increase would lead to widespread job loss among the very workers the legislation was intended to help.

The first stage of the increase has been in effect for over six months, and it is now possible to investigate these claims. This paper examines data from the U.S. government's monthly Current Population Survey for the six months from October 1996 through March 1997 (and for the same period a year earlier) to assess the impact of the minimum-wage increase on the distribution of wages, the distribution of family income, and the employment opportunities of low-wage workers. While the analysis deals only with the first six months at the new wage level, these early results suggest clearly that:

- the higher minimum wage has substantially boosted the earnings of low-wage workers;
- the benefits of the minimum-wage increase went primarily to low-income working families; and
- employment opportunities for teenagers and young adults — groups that opponents of the minimum wage singled out as particularly vulnerable — were not adversely affected by the increase.

The following sections look at these three findings in detail.

Did the Minimum-Wage Increase Boost Wages?

The economic impact of the $0.50 increase depends on the share of the workforce earning between $4.25 and $4.74 an hour. If few workers were affected by the increase, the impact should be negligible. But if many workers were affected, the impact on wages, incomes, and perhaps employment should be significant.

Economists traditionally use the economic impact of minimum-wage increases on teens and young adults as an indication of the probable impact on low-wage workers of all ages.' This study follows that procedure by focusing on the employment and earnings of teenagers age 16-19 and young adults age 20-24. Since these workers are just beginning their working lives, a large share of them earn low wages. This is not to say, however, that most minimum-wage workers are teenagers. While a disproportionate share of teenagers earn the minimum wage, most minimum-wage workers are adults. Prior to the increase in October, for example, 66% of workers earning between $4.25 and $4.75 were age 20 or older.

The $0.50 increase in the minimum wage on October 1, 1996 had a substantial positive effect on the wages of teenagers and young adults. Table **1A** displays the wage distribution for teenage and young adult workers in the six months immediately before the increase; Table **1B** reports the same information for the six months immediately following the increase (see the data appendix for a full description of the wage information). The data in Table 1A show that, just prior to the increase, 9.8% of teenagers earned exactly $4.25 (the old value of the minimum wage) and another 10.2% earned between $4.26 and $4.74. The data in Table 1B show that, after the increase, the share of teenage workers earning exactly $4.25 fell to 2.7%, and the share earning between $4.26 and $4.74 declined to 5.5%. Over the same two periods, the share of teenage workers earning exactly $4.75 (the new minimum wage) increased from 2.9% to 11.5%. The data for young adults show similar, but smaller, changes. The share of young adults in the wage range ($4.25-$4.74) affected by the October 1 increase fell from 6.7% to 3.0%, while the share at the new minimum wage of $4.75 rose from 1.1% to 3.2%.[2]

The minimum wage had the biggest impact on the wages of black and Hispanic teenagers.[3] Before the October 1 increase, 3 1.2% of black teens and 24.8% of Hispanic teens earned between $4.25 and $4.74. After the increase, the share of workers in this range fell to 14.3% for black teens and 5.2% for Hispanic teens. In the six months before the minimum-wage hike, only 3.9% of black teens earned $4.75, but over the six months after the increase, the share climbed to 11.9%. For Hispanic teens, the share earning $4.75 was 2.5% before October 1; it jumped to 14.8% after the increase.[4]

Some economists have argued that increases in the minimum wage will affect the wages of workers above the new $4.75 level because employers will raise wages of these better-paid workers in order to maintain relative pay differences within the firm (see, for example, Spriggs and Klein 1994). The wage data show some signs of these "spillover" effects, especially for black male and Hispanic female teenagers. **Table 1C** reflects signs of such spillovers.[5] For example, the share of black male teenagers earning exactly $4.75 grew 9.1 percentage points after the increase. At the same time, the share earning between $4.76 and $5.14 per hour — a range above the level required by law — increased 12.7 percentage points; even the share of those earning $5.15 or more rose 7.3 percentage points. Similarly, for Hispanic female teens, the share of workers earning $5.15 or more jumped 9.6 percentage points after the October 1 increase.

TABLE 1A
Distribution of Wages by Demographic Characteristics, April-September 1996

Type of Employees	Percent of Employees Earning						Number in Sample
	$0.50 – $4.24	$4.25	$4.26 – $4.74	$4.75	$4.76 – $5.14	$5.15 +	
All	2.1	1.5	2.1	**0.5**	4.7	89.1	75,732
Teenagers (16-19)	7.2	9.8	10.2	**2.9**	20.5	49.4	4,482
Male	6.2	9.1	10.3	**2.5**	19.9	**52.0**	2,270
Female	8.3	10.5	10.2	**3.3**	21.1	**46.6**	2,212
White	7.1	9.1	9.6	**2.8**	20.3	**51.1**	3,608
Male	6.2	8.0	9.6	**2.6**	19.4	**54.2**	1,817
Female	8.1	10.2	9.7	**3.0**	21.2	**47.9**	1,791
Black	8.9	14.2	17.0	**3.9**	20.1	**35.9**	359
Male	7.1	18.3	21.3	**1.8**	17.2	**34.3**	169
Female	10.5	10.5	13.2	**5.8**	22.6	**37.4**	190
Hispanic	5.5	12.8	12.0	**2.5**	23.5	**43.7**	366
Male	5.0	10.9	9.5	**1.8**	25.0	**47.7**	220
Female	6.2	15.8	15.8	**3.4**	21.2	**37.7**	146
1.8 **Young Adults (20-24)**	**3.1**	3.0	3.7	1.1	9.1	**80.1**	7,368
Male	2.4	2.7	3.2	0.7	8.3	82.5	3,705
Female	3.7	3.2	4.1	1.4	9.9	77.7	3,663
White	2.8	2.3	3.2	1.0	8.3	82.4	5,470
Male		1.9	2.7	0.7	7.5	85.5	2,732
Female	3.8	2.8	3.7	1.4	9.1	79.4	2,738
Black	3.4	5.2	6.4	2.3	13.5	69.2	653
Male	3.8	6.9	4.8	2.8	13.5	68.2	289
Female	3.0	3.8	7.7	1.9	13.5	70.1	364
Hispanic	4.6	6.1	4.4	0.7	12.1	72.1	856
Male	4.8	5.4	5.2	0.2	10.9	73.4	497
Female	4.2	7.0	3.3	1.4	13.9	70.2	359

Source: EPI analysis of CPS ORG.

TABLE 1 B
Distribution of Wages by Demographic Characteristics, October 1996 to March 1997

Type of Employees	Percent of Employees Earning						Number in Sample
	$0.50 – $4.24	$4.25	$4.26 – $4.74	$4.75	$4.76 – $5.14	$5.15 +	
All	1.9	0.4	1.1	1.6	4.4	**90.6**	76,745
Teenagers (16-19)	5.2	2.7	5.5	11.5	23.6	51.5	4,094
Male	4.2	2.4	5.1	11.1	23.7	53.4	2,034
Female	6.1	3.0	6.0	11.8	23.5	49.7	2,060
White	5.0	2.4	5.7	11.1	23.6	52.2	3,267
Male	4.2	2.0	5.5	10.6	23.6	54.2	1,637
Female	5.8	2.9	5.9	11.7	23.6	50.1	1,630
Black	6.8	5.4	8.9	11.9	27.1	39.9	336
Male	5.1	5.8	6.6	10.9	29.9	41.6	137
Female	8.0	5.0	10.6	12.6	25.1	38.7	199
Hispanic	5.5	2.9	2.3	14.8	24.3	50.1	345
Male	3.6	3.6	1.5	15.2	23.9	52.3	197
Female	8.1	2.0	3.4	14.2	25.0	47.3	148
Young Adults (20-24)	**2.6**	1.0	2.0	3.2	8.8	82.4	7,285
Male	2.1	1.1	1.9	2.6	7.5	84.8	3,694
Female	3.1	0.9	2.1	3.7	10.2	79.9	3,591
White	2.5	0.9	1.6	2.7	8.0	84.3	5,318
Male	2.1	0.9	1.5	1.9	6.6	86.9	2,672
Female	3.0	0.9	1.7	3.5	9.4	81.6	2,646
Black	**4.4**	1.9	3.6	3.3	11.7	75.1	676
Male	4.2	2.8	2.8	2.4	11.5	76.2	286
Female	4.6	1.3	4.1	3.8	11.8	74.4	390
Hispanic	2.5	1.3	2.8	6.5	11.8	75.1	906
Male	1.9	1.5	3.0	6.8	10.1	76.7	533
Female	3.5	1.1	2.4	6.2	14.2	72.7	373

Source: EPI analysis of CPS ORG.

TABLE 1C
Change of Distribution of Wages by Demographic Characteristics, April-September 1996 to October 1996-March 1997

	Change in Percent of Employees Earning					
Type of Employees	$0.50 – $4.24	$4.25	$4.26 – $4.74	$4.75	$4.76 – $5.14	$5.15 +
All	**-0.2**	-1.1	-1.0	1.1	**-0.3**	1.5
Teenagers (16-19)	-2.0	-7.1	-4.7	8.6	**3.1**	2.1
Male	-2.0	-6.7	-5.2	8.6	**3.8**	1.4
Female	-2.2	-7.5	-4.2	8.5	**2.4**	3.1
White	-2.1	-6.7	-3.9	8.3	**3.3**	1.1
Male	-2.0	-6.0	-4.1	8.0	**4.2**	0.0
Female	-2.3	-7.3	-3.8	8.7	**2.4**	2.2
Black	-2.1	-8.8	-8.1	8.0	**7.0**	4.0
Male	-2.0	-12.5	-14.7	9.1	**12.7**	7.3
Female	-2.5	-5.5	-2.6	6.8	**2.5**	1.3
Hispanic	0.0	-9.9	-9.7	12.3	**0.8**	6.4
Male	-1.4	-7.3	-8.0	13.4	**-1.1**	4.6
Female	1.9	-13.8	-12.4	10.8	**3.8**	9.6
Young Adults (20-24)	-0.5	-2.0	-1.7	2.1	**-0.3**	2.3
Male	-0.3	-1.6	-1.3	1.9	**-0.8**	2.3
Female	-0.6	-2.3	-2.0	2.3	**0.3**	2.2
White	-0.3	-1.4	-1.6	1.7	**-0.3**	1.9
Male	0.3	-1.0	-1.2	1.2	**-0.9**	1.4
Female	-0.8	-1.9	-2.0	2.1	**0.3**	2.2
Black	1.0	-3.3	-2.8	1.0	**-1.8**	5.9
Male	0.4	-4.1	-2.0	-0.4	**-2.0**	8.0
Female	1.6	-2.5	-3.6	**1.9**	**-1.7**	4.3
Hispanic	-2.1	-4.8	-1.6	5.8	**-0.3**	3.0
Male	-2.9	-3.9	-2.2	6.6	**-0.8**	3.3
Female	-0.7	-5.9	-0.9	4.8	**0.3**	2.5

Source: EPI analysis of CPS ORG.

Who Benefited From the Increase?

While it appears to be true that the minimum-wage increase raised the pay of low-wage workers, is it also true that these higher wages went to low-income families? Figure 1 illustrates how the policy predominantly benefited low-income working families. (See the appendix for a discussion of the methods used in this figure.) In the case of ail working families, including those with only one member, 55.6% of the gains from the increase went to families in the bottom 40%, and 7 1.2% of the gains went to families in the bottom 60%. Note that families in the bottom two-fifths received only 16.0% of all income, while families in the bottom three-fifths received 32.2% of all income. Families in the top fifth, with 45.0% of all income, received the smallest share of gains from the increase (13.5%). The patterns are similar for families of two or more individuals (bottom figure). In the end, most of the added earnings generated by the minimum-wage increase went to the low-income families who needed it most.

Did the Increase Cause Job Loss?

The potential for job loss is the most controversial aspect of the minimum-wage increase. Opponents of the increase have consistently contended that it lowers employment opportunities for teenagers (and to a lesser extent, young adults). Supporters of the increase have disagreed, citing much empirical research showing little or no "disemployment" effects.[6]

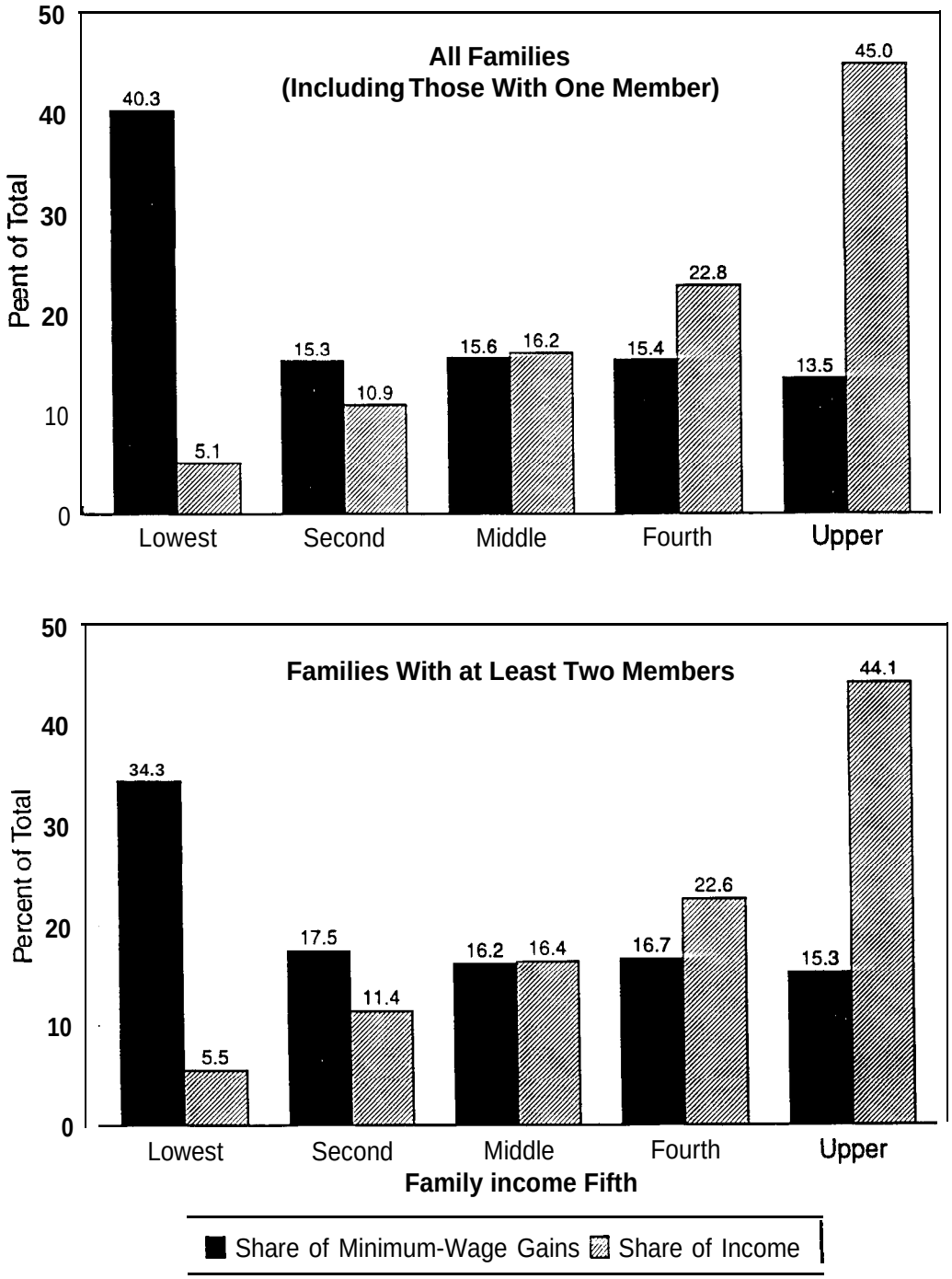
To determine if the minimum-wage increase led to declining job opportunities, we examined the trends in the employment rates (employment to population ratios) of teenage and young adult workers. Our examination takes into account three factors that can have an impact on the results: seasonal variations, economic growth, and regional trends. We find that the *minimum-wage increase had no significant effect on the employment of teens or young adults, one way or the other.*

Table 2 summarizes our analysis of the minimum-wage increase's impact on employment. Column 4 indicates the percentage of persons in each age group employed during the six-month period immediately before the October 1 minimum-wage increase. Among teenagers, for example, the employment rate was 46.6% in April-September 1996. Column 5 lists the percentage employed for the six-month period immediately after the increase went into effect (October 1996-March 1997). For teenagers, the employment rate in this most recent six-month period fell to 40.8%, a drop of 5.8 percentage points when compared to the preceding six months. But this analysis would fail to take into consideration the seasonal variations inherent in teenage employment trends, especially the temporary rise in teenage employment associated with summer vacation.

To control for the seasonal employment effect, we compare the change in employment between April-September 1996 and October 1996-March 1997 with the change between the same two periods a year earlier — when the minimum wage did not change. Columns 1 and 2, which show the employment rates for these earlier periods, indicate that, among all teenagers, the employment rate fell from 47.6% in the April to September period to 40.7% in the October to March period — a 6.9 percentage-point drop (see column 3). The decline in teenage employment after the minimum-wage increase went into effect, then, was 1 .O percentage point *lower* than a year earlier, when the minimum wage remained unchanged.

FIGURE 1

Distribution of Minimum-Wage Gains and Income Shares by Fifth, 1996



Note: Families have at least one earner.

Source: EPI analysis of March CPS data (see data appendix).

TABLE 2
Estimated Change in Employment Associated With the Minimum-Wage Increase in October 1996, All, Teenagers, and Young Adults

	1995-96			1996-97			Difference-in-Difference		
	Apr-Sep (1)	Oct-Mar (2)	Difference (3)	Apr-Sep (4)	Oct-Mar (5)	Difference (6)	Raw (7)	Growth-Adjusted (8)	State & Growth Adjusted (9)
All	63.2	62.6	-0.7	63.6	63.2	-0.3	0.3	n.a.	n.a.
Teenagers (16-19)	47.6	40.7	-6.9	46.6	40.8	-5.8	1.0	0.5	0.4
Young Adults (20-24)	70.6	68.1	-2.5	70.9	69.4	-1.5	0.9	0.6	0.7

Note: This method of estimating the employment effect of the minimum-wage increase is explained in the text. None of the estimated employment changes in columns 7. 8, and 9 is statistically significant at standard levels.

Source: Economic Policy Institute analysis of CPS.

So, after controlling for the seasonal employment effect, the data suggest that teenage employment actually *increased* after the minimum wage rose, though this increase was not statistically significant. We observe a similar trend for young adults.

We must also account for the impact of economic growth, both nationally and within regions. The data in columns **8** and 9 adjust for these two factors.[7] The "growth-adjusted" estimates in column 8 are less positive than the "raw" estimates derived above, indicating that economic growth was more rapid in the year that the minimum wage increased than it had been in the preceding year. The growth in teen employment, for example, falls from a 1 .O percentage-point increase to a smaller 0.5 percentage-point increase after controlling for overall growth. Further controlling for the different levels of economic growth within states (column 9) subtracts another 0.1 percentage point from the positive employment effect for teenagers. However, as with the employment gains found above, none of these results are statistically significant.

Table 3, which focuses only on the differences between the year-to-year periods (the complete table is in the appendix), builds on this analysis by examining the employment effects of the wage increase on groups organized by sex and race. White male teenagers saw employment rates increase after the minimum wage went into effect, even after controlling for overall economic growth and state differences in

TABLE 3
Differences-in-Differences in Employment Rates, All Groups

	Difference-in-Difference		
	Raw	Growth Adjusted	State & Growth Adjusted
All	0.3	n.a.	n.a.
Teenagers (16-19)	1.0	0.5	0.4
Male	0.7	0.4	0.4
Female	1.4	0.8	0.6
White	0.6	0.1	0.0
Male	0.8	0.5	0.4
Female	0.3	-0.0	-0.0
Black	-1.6	-2.1	-1.8
Male	-2.6	-2.9	-2.3
Female	-0.6	-1.4	-1.4
Hispanic	4.3	4.1	3.8 #
Male	0.5	0.7	0.7
Female	8.1	7.0	6.5 *
Young Adults (20-24)	0.9	0.6	0.7
Male	1.2	0.9	1.1
Female	0.6	0.5	0.7
White	0.5	0.2	0.4
Male	1.4	1.1	1.2
Female	-0.5	-0.5	-0.3
Black	-2.4	-2.7	-2.5
Male	-5.5	-5.8	-5.6"
Female	0.2	0.4	0.5
Hispanic	5.6	5.0	5.1 .
Male	4.4	3.9	4.0 #
Female	6.1	6.4	6.4 *

#: statistically significant at the 0.10 level

●: statistically significant at the 0.05 level

Note: This method of estimating the employment effect of the minimum-wage increase is explained in the text.

Source: Economic Policy institute analysis of CPS.

employment growth. This increase, however, was not statistically significant.' Among black teenagers, employment rates appeared to fall, but these declines were also not statistically significant. Hispanic teenagers were the only group that experienced a statistically significant employment increase, even after adjusting for overall economic growth and state effects. This employment increase suggests that raising the minimum wage may have been responsible for this group's increase employment.[9] Hispanic females experienced the largest employment jump.

Changes in the employment rates for male and female young adults and for white young adults were also positive but statistically insignificant. Employment rates for young adult black males were negative, but statistically significant only at a marginal (0.10) level. Shifts in the employment rates of Hispanic young adults were positive and significant (at the 0.05 level). As with teenagers, this result for Hispanics appears largely to reflect rising employment rates among young women.

We advise against drawing strong conclusions from the results for minority subgroups since the employment data for these subgroups are volatile and produce substantial variations in both the size of the estimated employment effects and their statistical significance. For example, estimates of the size of the minimum wage's employment effect on black men, age 20-24, vary by a factor of two over the six-month period and are not consistently statistically significant.[10] The high variance for this particular subgroup, and other minority subgroups, reflects both an underlying employment volatility and the relatively small sample sizes.

The findings in this report raise a number of questions:

(1) Why use employment instead of unemployment rates?

Employment rates are typically used in the analysis of minimum-wage increases because they directly address the question of whether the increase has led to job loss. Unemployment rates are less reliable in this regard because they can rise due to an increase of job seekers entering the labor force. An increase in the minimum wage, for example, can draw additional workers into the labor force who are initially unemployed as they begin their job search. If this inflow causes the labor force to grow more quickly than job opportunities available to absorb the new workers, unemployment rates will rise faster than employment rates, even though no jobs have been lost.

(2) ***Is six months long enough for the disemployment effects to materialize?***

Job turnover rates in the U.S. economy are high, especially for low-wage workers. Six months is a reasonable amount of time to observe at least ***some*** impact. Those who argue otherwise should specify a time period after which their claims can be put to an empirical test.

(3) ***Zsn't it likely that the disemployment effects will surface only after the full increase is in place?***

The opposition based its arguments on the traditional textbook model which maintains that increasing the cost of low-wage labor will lead to disemployment. The staggered implementation of the increases does not alter this prediction. As this study shows, significant proportions of young workers' wages were raised by the first increase, and, according to the textbook theory of

disemployment, many of these workers should have lost their jobs. As with past increases in the minimum wage, this prediction proved incorrect.

Conclusion

This examination of the increase in the minimum wage shows that, so far, the policy has had the desired impact: it has raised the earnings of low-wage workers, lifted the incomes of their families, and, despite opponents' claims, has not led to job loss. This last finding is particularly important for future debates over raising the minimum wage. Given the statistically and economically insignificant (and mostly positive) employment effects of the change, it might be more useful if the next debate spends less time focusing on the cost of the increase and more time on the benefits to low-income families.

July 1997

This work was supported by grants from the Rockefeller and Charles Stewart Mott Foundations, and the U.S. Department of Labor.

Danielle Gao and David Webster provided research assistance for this paper.

DATA APPENDIX

Tables 1A-C: Description of Wage Data

This study uses wage data from the Outgoing Rotation Group (ORG) of the Current Population Survey (CPS). The ORG sample consists of one-fourth of the people responding to the full monthly sample of the CPS (the data source for our examination of employment changes; see the notes for Table 2, below). Our sample includes all employees 16 years of age or older who earned between $0.50 and $100.00 per hour (in 1989 dollars).

Hourly earnings include tips, overtime, bonuses, and commissions for each worker. Calculation of hourly earnings involves several steps designed to cope with problems of (1) variable hours; (2) topcoding; and (3) tips, overtime, bonuses, and commissions. A description of the full procedure follows.

All non-topcoded, hourly paid workers who say that they do not receive tips, overtime, bonuses, or commissions are given the usual hourly wage from their survey response. All non-topcoded workers who are not paid by the hour are assigned an hourly wage calculated as their usual weekly earnings including tips, overtime, bonuses, and commissions divided by their usual number of hours worked per week.

Usual Hours

Beginning in 1994, the CPS allowed respondents to indicate that they did not have a "usual number of hours worked per week." Since the calculation in this study of hourly earnings for salaried employees and for hourly paid employees who receive tips, overtime, bonuses, and commissions depends on dividing usual weekly earnings by usual hours worked, we have been forced to estimate usual hours worked per week for about 7% of the sample who report that their hours vary. When necessary, we predict usual weekly hours for those reporting variable hours by using the results from a regression equation on the sample (by year, by sex) that reports usual and actual hours worked in the previous week. Specifically, we regress usual hours worked per week on actual hours worked in the reference week and full-time status, a dummy variable for married, five dummy variables for educational attainment, a quartic in age, three dummy variables for race and ethnicity, and 10 dummy variables for broad occupation (all interacted with full-time status). We then use the coefficients from this equation to estimate usual weekly hours for those workers who say that their hours vary.

Tips

About 20% of hourly paid workers received tips, overtime, bonuses, or commissions as part of their regular earnings. Since many workers who may have been affected by the minimum wage worked in industries where tipping is common, we have been careful to include these earnings in our calculation of usual hourly rates. The CPS survey first asks hourly paid workers to report their hourly wage excluding tips, overtime, bonuses, and commissions. Later, it asks if hourly paid workers receive tips, overtime, bonuses, or commissions. If these workers answer yes, then the survey asks for the worker's usual weekly earnings including tips, overtime, bonuses, and commissions. In these cases, we use the usual weekly earnings figure, divided by the usual hours worked per week (reported or estimated as above), to estimate the usual hourly earnings including tips, overtime, bonuses, and commissions.

Figure 1 :The Distribution of Family Income and Wage Gains From the Increase

These data are derived from the March 1996 Current Population Survey (CPS). The March CPS includes a retrospective supplement wherein respondents are asked to provide information on the prior year's income. We took hourly wage data, however, from the March ORG, as described above, since we judged these wage data to more accurately reflect the wage structure over the period of interest. Information on annual income, however, is from 1995.

For workers whose earnings were in the affected range ($4.25$4.74) in March 1996, we first calculated ***their*** hourly increase as a result of setting the minimum at $4.75. We then multiplied this value by their annual hours worked in 1995. This product represents their annual gains from the increase (note the assumption of no hours reduction). We then divided families in quintiles based on their annual income, with an equal number of persons (not families) in each quintile. Finally, we calculated the share of income and wage gains that accrued to each quintile.

Table 2: Employment Rates

The data for this table come from the basic monthly files of the CPS, the primary source of labor market microdata on employment, unemployment, wage rates, and demographics. Each month the Census Bureau, under contract with

the Bureau of Labor Statistics (BLS), collects nationally representative data from approximately 50,000 households. Sample weights, which represent the inverse of the probability that a person with specific demographic and geographic characteristics will be sampled, are provided so the data can be "weighted up" to national levels. These data provide the basis for the monthly unemployment rate, released by BLS on the first Friday of each month.

The employment rates in Table 2 are calculated from the weighted sample over the time periods shown. For example, the 47.6% employment rate for teenagers in column 1 represents the average weighted employment levels from April to September 1995 divided by the average weighted population level over that same period.

One advantage to using the basic monthly files is that their sample sizes are large enough to allow for fairly reliable disaggregation by demographic group. For example, there were an average of around 7,000 unweighted cases per month of 16-19-year-olds, with about 5,000 white, slightly less than 1,000 African American, and 750 Hispanic teens. (Note that our racial/ethnic classifications, unlike those of BLS, are exclusive. In BLS data, Hispanics can be in other racial categories: in our data, they are in an exclusive category.)

Standard Errors

Large sample sizes are considered advantageous in quantitative analysis because statistical reliability rises with the size of the underlying sample. Nevertheless, any sampled data is prone to sampling error, and the extent of this error in Tables 2 and 3 is represented by asterisks (and given in column 9 of Appendix Table 2).

Given the nonrandom sampling framework of the CPS, the calculation of standard errors is not straightforward." The calculation of the most reliable standard errors would call for the use of special sampling weights that are not included on the public use file. BLS publishes such standard errors for many of its estimates, but these rarely correspond to either our time frame or demographic groups. Therefore, we needed to derive an efficient and reliable method for estimating standard errors for the many categories in Table 2.

We began by using a slightly altered version of the general formula for the standard error of a rate: ,

$$\sqrt{(p_{wt}*(1-p_{wt}))/n_{unwt}}$$

p in this case is the weighted rate, while ***n*** is the unweighted average of the population in question over the time period. Averages, instead of sums, are appropriate because 75% of the cases in the monthly CPS are in the sample one month to the next, due to the sample rotation procedure. We adjust this value by a factor provided by BLS for data over longer time periods. This factor, from various tables in the appendix to the monthly publication ***Employment and Earnings,*** deflates the standard error slightly due to the independence of 25% of the monthly cases. By calculating rates and standard errors for some of the same groups of persons published in ***Employment and Earnings, we*** determined that this method was acceptable for levels.

The same publication allows us to calculate BLS's standard errors for changes, and these revealed that our approach tended to overestimate standard errors of differences and thus introduce the possibility of incorrectly rejecting significant findings. In order to avoid this possibility, we further adjusted the standard errors of the differences by the ratio of the BLS standard errors of differences to our previously adjusted standard errors. Including both the deflation factor noted above (which lowers the standard error due to the inclusion of more independent cases) and the correction for the overestimate just noted, we derived an adjustment factor of 0.619.

Adjusting for Overall Growth and State Effects

As discussed in the text, we attempt to extract the effect of overall economic growth on our estimate of the impact of the minimum-wage increase on employment rates. The adjusted value appears in column 8 in Table 2. We produced this adjustment by regressing the time series of employment rates (prior to the increase) for the various groups in the table on the employment rates of workers 25 years old and over (by sex), a trend variable, and dummies for the summer months (since the employment data were not seasonally adjusted). We then multiplied the coefficient on the 25+ variable by the change in those adults' employment rates over the periods in question, and subtracted this value from the raw estimate in column 7 of Table 2. Since the growth in the employment rates of adults is a good proxy for overall labor market growth, this procedure should remove the effect of such growth.

In order to adjust for state effects (the different impact of state economies on the employment rates of teens and young adults), we estimated a weighted linear probability model (1=employed, 0=not employed) for the CPS microdata with dummy variables for each demographic group in each time period and for 50 of the 5 1 "states" (including the District of Columbia). Without a constant term, the coefficients on the dummies for each demographic group in each time period represent the employment rate of that group in that time period, controlling for "state effects."

APPENDIXTABLE 1
Distribution of Wages by Demographic Characteristics, Differences-in-Differences, 1995/96 to 1996/97

	Change in Percent of Employees Earning					
Type of Employees	$0.50 – $4.24	$4.25	$4.26 – $4.74	$4.75	$4.76 – $5.14	$5.15 +
All	0.08	-0.4	-0.2	0.6	-0.1	0.0
Teenagers (16-19)	-1.9	-6.4	-4.1	8.4	3.6	0.4
Male	-2.3	-6.0	-6.1	8.9	4.7	0.6
Female	-1.6	-6.6	-2.1	7.6	2.7	0.0
White	-2.1	-5.4	-3.4	7.8	3.6	-0.5
Male	-2.5	-5.3	-4.9	7.9	4.9	0.1
Female	-1.7	-5.3	-2.0	7.8	2.5	-1.4
Black	-4.2	-5.1	-7.0	6.6	5.4	4.2
Male	-3.6	-7.0	-16.2	9.5	13.5	3.7
Female	-5.1	-3.0	0.7	4.3	-1.1	4.1
Hispanic	4.4	-16.9	-7.7	13.8	5.4	0.8
Male	3.9	-9.3	-8.9	16.9	-0.2	-2.3
Female	5.2	-27.1	-6.8	9.7	13.2	5.7
Young Adults (20-24)	0.0	-2.5	-0.7	1.8	-0.3	1.6
Male	-0.1	-2.4	-0.7	1.8	-1.0	2.6
Female	0.3	-2.6	-0.7	1.9	0.5	0.5
White	0.0	-1.7	-0.8	1.4	-0.1	1.2
Male	0.3	-1.6	-0.4	1	-0.9	1.3
Female	-0.3	-1.9	-1.2	1.7	0.7	0.9
Black	1.4	-3.1	0.1	0.2	-0.6	2.1
Male	-1.0	-2.6	-0.9	-1.3	0.1	5.7
Female	3.5	-3.3	0.8	1.0	-1.6	-0.4
Hispanic	0.0	-7.3	0.0	5.6	-1.8	3.5
Male	-0.7	-6.5	-1.9	6.8	-3.8	6.3
Female	1.2	-8.2	2.7	4.1	0.9	-0.6

Source: EPI analysis of CPS ORG.

APPENDIXTABLE 2
Estimated Change in Employment Associated With the Minimum-Wage Increase in October 1996

	199596			1996-97			Difference-in-Difference			
	Apr-Sep (1)	Ott-Mar (2)	Difference (3)	Apr-Sep (4)	Ott-Mar (5)	Difference (6)	Raw (7)	Growth-Adjusted (8)	State-Adjusted (9)	Standard Error (10)
All	63.2	62.6	-0.7	63.6	63.2	-0.3	0.3	n.a.	n.a.	0.2
Teenagers	47.6	40.7	-6.9	46.6	40.8	-5.8	1.0	0.5	0.4	0.7
Male	48.8	40.3	-8.5	47.5	39.8	-7.7	0.7	0.4	0.4	1.0
Female	46.3	41.0	-5.3	45.7	41.7	-4.0	1.4	0.8	0.6	1.0
White	54.8	47.0	-7.8	54.3	47.1	-7.2	0.6	0.1	0.0	0.9
Male	55.8	46.1	-9.7	54.5	45.7	-8.8	0.8	0.5	0.4	1.2
Female	53.7	47.9	-5.8	54.1	48.6	-5.5	0.3	-0.0	-0.0	1.3
Black	27.6	25.0	-2.6	28.6	24.4	-4.2	-1.6	-2.1	-1.8	1.8
Male	27.3	22.9	-4.4	28.3	21.3	-7.0	-2.6	-2.9	-2.3	2.6
Female	27.9	27.1	-0.8	28.9	27.4	-1.5	-0.6	-1.4	-1.4	2.5
Hispanic	37.3	31.4	-5.9	34.1	32.5	-1.6	4.3	4.1	3.8	2.1
Male	40.8	36.6	-4.2	39.9	36.1	-3.8	0.5	0.7	0.7	3.1
Female	33.6	26.0	-7.6	28.0	28.6	0.6	8.1	7.0	6.5	2.9
Young Adults	70.6	68.1	-2.5	70.9	69.4	-1.5	0.9	0.6	0.7	0.7
Male	77.1	72.8	-4.3	76.4	73.4	-3.0	1.2	0.9	1.1	0.9
Female	64.2	63.5	-0.7	65.6	65.5	-0.1	0.6	0.5	0.7	0.9
White	75.5	72.9	-2.6	76.0	73.8	-2.2	0.5	0.2	0.4	0.7
Male	80.7	75.9	-4.8	80.2	76.8	-3.4	1.4	1.1	1.2	1.0
Female	70.4	69.9	-0.5	71.8	70.8	-1.0	-0.5	-0.5	-0.3	1.1
Black	55.8	56.0	0.2	57.7	55.4	-2.3	-2.4	-2.7	-2.5	2.1
Male	60.4	60.2	-0.2	61.4	55.6	-5.8	-5.5	-5.8	-5.6	3.1
Female	52.0	52.5	0.5	54.5	55.2	0.7	0.2	0.4	0.5	2.7
Hispanic	64.8	61.5	-3.3	65.0	67.3	2.3	5.6	5.0	5.1	1.9
Male	78.8	74.5	-4.1	77.5	77.8	0.3	4.4	3.9	4.0	2.4
Female	49.3	47.1	-2.2	51.1	55.0	3.9	6.1	6.4	6.4	2.8

Source: EPI analysis of CPS.

Endnotes

1. See, for example, Brown et al. 1982 and Card and Krueger 1995.

2. Note that some workers in Tables 1A and 1B earn less than the prevailing minimum wage ($4.25 for Table 1A; $4.75 for Table 1B). These workers (1) may not be covered by the federal minimum wage (family members working in a family-owned business, for example); (2) may work for employers who are not complying with the law; (3) may have inaccurately reported their hourly wage, usual hourly earnings, or usual weekly hours; or (4) may have been assigned an erroneous hourly wage as a result of the hours-imputation process used for workers who do not work a usual number of hours per week.

3. We use official Census terminology to refer to racial and ethnic minorities. Our categories, however, differ from the Census in that our white and black groups exclude Hispanics.

4. Among black teenagers, the wage effects were largest for males; among Hispanic teens, females received the largest boost.

5. The shift in the distribution could reflect ongoing nominal wage growth, but it seems more likely that most of the movement in the teen and young adult wage distribution responds to the minimum-wage increase. First, the overall wage distribution, which is both less responsive to the minimum wage and more responsive to average wage growth, changes little across the two six-month periods. Second, the pattern of changes in the distribution is consistent with the idea that it is the minimum wage, not nominal wage growth, that is behind the shift in the distribution. After the increase, many workers are "bunched" at exactly $4.75.

6. For an excellent review of the previous literature on the minimum wage, see Card and Krueger (1996), chapters 6-9.

7. See the data appendix for an explanation of the methods used to adjust the raw employment rate changes.

8. White female teenagers appeared to experience a small (0.3 percentage point) increase in employment, but the rise disappears after controlling for economic growth.

9. Those differences marked with the # sign are statistically significant at the 0.10 level, that is, if we were to repeat the estimation procedure 100 times with a different random sample from the same population, we would expect that the confidence interval we construct would include the "true" employment change 90 times. Results marked with an asterisk are significant at the 0.05 level, that is, if we were to repeat the estimation procedure 100 times we would expect that the confidence interval we construct would include true value 95 times. In this sense, results marked * are more reliable than those marked #.

10. For instance, when we repeat the analysis using seven-month periods, the impact of the raw and growth-adjusted employment effect for black men, age 20-24, diminishes and is no longer statistically significant. The seven-month results for the other groups are not qualitatively different from those using the six-month periods in Table 2.

11. These issues are discussed in the BLS's monthly *Employment and Earnings. See,* for example, pp. 225-42 in the January 1997 issue.

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