Minimum Wage Effects in the Longer Run

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ABSTRACT

Exposure to minimum wages at young ages could lead to adverse longer-run effects via decreased labor market experience and tenure, and diminished education and training, while beneficial longer-run effects could arise if minimum wages increase skill acquisition. Evidence suggests that as individuals reach their late 20s, they earn less the longer they were exposed to a higher minimum wage at younger ages, and the adverse longer-run effects are stronger for blacks. If there are such longer-run effects of minimum wages, they are likely more significant than the contemporaneous effects on youths that are the focus of research and policy debate.

I. Introduction

Exposure to a high minimum wage during the early years in the labor market may generate adverse effects that persist in the longer run. If so, then the focus of most research and policy debate on minimum wages on their contemporaneous, short-run effects on teens and young adults may be misplaced. Minimum wages may lower formal training among young workers, reduce accumulation of labor market skills and experience by deterring employment, and discourage school enrollment, although these conclusions are not without controversy (see, for example, Acemoglu and Pischke 2003; Burkhauser, Couch, and Wittenburg 2000; Card and Krueger 1995; Chaplin, Turner, and Pape 2003; Neumark and Wascher 2001 and 2003). Research on the human capital model emphasizes the importance of early investment decisions regarding schooling, experience, and training, and establishes their long-lasting impacts. It therefore follows that the short-run effects of minimum

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wages on young workers could have lasting adverse effects on wages, employment, and other labor market outcomes. The longer-run impact could be exacerbated by the scarring effects of early nonemployment (Ellwood 1982). On the other hand, longer-run effects that counter some of the potential adverse short-run effects are also possible. For example, minimum wages could lead to increased skill acquisition if a higher wage floor raises the productivity level necessary for a worker to be employable. Finally, workers are exposed to many other shocks and influences, which might lead one to expect that early influences will not have much long-run impact. Our findings suggest that, on net, there are adverse longer-run effects of minimum wages, as individuals exposed to higher minimum wages as teens and young adults have lower earnings in subsequent years.

The contribution of this paper is empirical estimation of some of the longer-run effects of minimum wages. Instead of simply asking how contemporaneous minimum wages affect employment for 16–19-year-olds (teens) or 20–24-year-olds (young adults), we estimate the effects of exposure to higher minimum wages at these younger ages—when minimum wages were most binding—on outcomes for somewhat older individuals (25–29-year-olds), and our estimates suggest that there may be adverse longer-run effects of exposure of teens and young adults to higher minimum wages. To help understand how these longer-run effects might arise, we discuss evidence on the contemporaneous effects of minimum wages on employment, training, and schooling of teens and young adults, and calculate what that evidence implies for the longer-run impact of minimum wages. This discussion emphasizes that these long-run effects could be significant even in the absence of detectable employment effects on teens and young adults; in particular, reductions in schooling or training among teens or young adults can have longer-run effects but be quite independent of changes in their employment.

Our findings are best interpreted as suggestive evidence that there may be longer-run adverse effects of minimum wages. More needs to be done to try to establish and understand the potential links between early exposure to minimum wages and later labor market outcomes, especially given that the effects of minimum wages on employment, schooling, and training of teenagers and young adults might not be regarded as settled questions. However, the possibility of longer-run adverse effects of minimum indicates the potential importance of more research on both of these questions, and should encourage a shift away from a near-exclusive focus on the contemporaneous effects of minimum wages on employment of teens and young adults.

II. Data

We use Current Population Survey (CPS) Outgoing Rotation Group (ORG) files for the years 1979–2001. We extract data on all individuals aged 16–29, and construct state-year-age cell averages (using CPS earnings weights),[1] to which we append information on state and federal minimum wages. In addition to contemporaneous minimum wages, we construct the minimum wage history that

1. In our regressions, we weight by the number of observations per cell, multiplied by the average CPS earnings weight for the cell to account for oversampling or undersampling of states.

each individual has faced, based on the higher of the state or federal minimum (the effective minimum) in each year in the state in which the individual currently resides. This introduces measurement error with respect to the true minimum wage history, because of state-to-state migration. Longitudinal data that followed individuals as they moved from state to state would better capture their minimum wage history, but would perhaps be more plagued by the endogeneity of migration.[2]

The CPS ORG files start in 1979, but there is of course earlier information on minimum wages. To avoid the potential confounding influences of the Vietnam War on youth labor markets we use minimum wage histories only back to 1973, when the draft and U.S. involvement in the war ended. As a consequence, the only birth cohorts we can consider for 1979 are the cohorts that were age 16 or younger in 1973, or 22 or younger in 1979. In contrast, toward the end of the sample period, we lose observations on later cohorts at older ages. The CPS data do not provide actual longitudinal observations on members of these cohorts as they age. But we can infer the effects of minimum wages on these cohorts at different ages because the CPS repeatedly draws random samples from these cohorts as they age.

Table 1 reports descriptive statistics for the sample, for the three age groups studied. The four outcome variables we study are wages, employment, weekly hours, and weekly earnings. Those who reported working last week or with a job but not working last week are considered as employed. Wages are treated as invalid if they are below one half of the federal minimum or above $100 (in 2001 dollars). In studying hours and earnings, we do not condition on employment, so that we estimate the overall effects of minimum wages on hours and earnings. The construction of wages, hours, and weekly earnings is sometimes complicated because of apparently bad data and missing data for those who report that they are working. As a consequence, there are sometimes fewer valid observations on individuals for these outcomes. In the full sample there are always individuals with valid measurements on each outcome in each state-year-age cell, so that the sample size for the data collapsed to these cells is always the same. But in analyses disaggregated by race (discussed later), this is not always the case.

The minimum is defined as of May of the calendar year; we chose this date because the greatest number of state minimum wage increases occurred in April (followed by January).[3] For each age group in each year and state, we construct the log of the average minimum wage to which the group was exposed over any earlier ages, which is what we use in our empirical analysis. To provide some information on how minimum wage exposure varies, the descriptive statistics are broken down by whether or not the current state minimum wage exceeds the federal minimum. Not surprisingly, the average effective state minimum wage since age 16 is higher in the group of observations in which the current state minimum exceeds the federal.

2. One strategy is to instrument for the minimum wage history in the state of residence with the history in the state of birth. The CPS does not, however, include data on state of birth. The NLSY79 provides the requisite longitudinal information, in principle. But the cohort was aged 14–22 in 1979, while most of the cross-state variation in minimum wages that we use begins in 1987 when the youngest respondent was 22 years old. The NLSY79 Young Adult file began in the mid-1990s with teenagers, and as yet has very few observations on individuals in their 20s. The PSID yields relatively small numbers of young individuals by state and year.

3. Details on state minimum wages and other aspects of this research are provided in Neumark and Nizalova (2004).

Table 1
Summary Statistics

	16–19-year-olds			20–24-year-olds			25–29-year-olds		
	Whole Sample	Current State Minimum Wage > Federal	Federal Minimum Wage Prevails Currently	Whole Sample	Current State Minimum Wage > Federal	Federal Minimum Wage Prevails Currently	Whole Sample	Current State Minimum Wage > Federal	Federal Minimum Wage Prevails Currently
Observations	4692	692	4000	5712	856	4856	4590	789	3801
Log average effective state	1.688	1.746	1.678	1.683	1.744	1.673	1.655	1.734	1.639
minimum wage, current ($2001)	(0.092)	(0.087)	(0.089)	(0.088)	(0.085)	(0.084)	(0.068)	(0.077)	(0.052)
Average log of effective state	1.694	1.740	1.685	1.704	1.733	1.699	1.697	1.732	1.689
minimum wage since age 16 ($2001)	(0.092)	(0.087)	(0.091)	(0.087)	(0.083)	(0.088)	(0.068)	(0.068)	(0.066)
Employment (percent)	46.45	44.96	46.70	70.43	69.68	70.56	78.84	79.04	78.80
	(14.59)	(15.52)	(14.41)	(8.91)	(10.42)	(8.62)	(6.50)	(6.82)	(6.43)
Wage ($2001)	6.54	7.10	6.44	9.15	9.96	9.00	12.34	13.72	12.06
	(0.96)	(1.16)	(0.88)	(1.49)	(1.74)	(1.40)	(1.79)	(1.91)	(1.62)
Weekly hours of work,	11.88	11.20	11.99	25.72	25.31	25.80	31.68	31.61	31.69
unconditional	(5.78)	(5.69)	(5.78)	(4.47)	(5.05)	(4.36)	(3.14)	(3.27)	(3.11)
Weekly earnings ($2001),	85.43	86.87	85.18	247.63	265.22	244.53	404.65	448.62	395.53
unconditional	(49.34)	(52.47)	(48.79)	(70.02)	(80.37)	(67.57)	(74.09)	(79.91)	(69.43)

Each observation is the mean for the cells defined by state, year, and age (by single year). Means of these observations are reported, with standard deviations of these means reported in parentheses. "Log average effective state minimum wage since age 16" is calculated inclusive of age 16. In computing mean weekly earnings, observations on individuals employed but not reporting a wage were weighted by P(employed)/P(employed and wage reported). Without this weighting, mean earnings would be biased toward zero because data on wages are missing for the employed but not the nonemployed. Minimum wages, wages, and earnings are converted to 2001 dollars based on the Consumer Price Index research series using current methods (CPI–U–RS); see http://www.bls.gov/cpi/cpiurstx.htm. Individual observations are weighted using CPS earnings weights. The number of observations for the whole sample for each age group comes from taking the number of times any single-year age appears in the data set, multiplied by 51 (for the 50 states and Washington, D.C.).

For 16–19-year-olds, employment is lower in the states with high minimum wages, and wages are higher. The higher wages in states with higher minimums likely reflect in part the implementation of state minimum wages in high-wage states. Hours are also lower, but weekly earnings are higher. The employment difference is smaller for the 20–24-year-old group, and for 25–29-year-olds, employment is actually a shade higher in the states with high minimum wages. However, these are only univariate comparisons.

III. Empirical Methods

We begin by estimating the effects of the contemporaneous minimum wage on wages, employment, hours, and earnings, using standard specifications of the form

$$(1)\quad Z_{ijt} = \alpha + \beta MW_{it} + S_i\theta_S + Y_t\theta_Y + A_j\theta_A + \varepsilon_{ijt},$$

where i indexes states, j indexes single-year age groups, and t indexes years. Z is alternatively: the log of average wages of workers in the state-year-age cell; the percentage employed in the cell; the average hours worked in the cell; and the log of average weekly earnings in the cell. MW is the log of the effective contemporaneous minimum wage. S, Y, and A are vectors of state, year, and single-year age dummy variables, respectively. Controls are not included for productivity-related characteristics that are potentially endogenous, such as schooling, because we do not want to control for variation in characteristics that may be influenced by minimum wages; instead, we want to capture both direct effects on wages (for example), as well as indirect effects via the accumulation of skills. The state dummy variables account for persistent state-level differences, and the year dummy variables sweep out common variation that could be driven by changes in aggregate economic conditions that are correlated with minimum wage changes. With the year dummy variables included, minimum wage effects are identified from variation in state minimum wages above the federal minimum.[4]

Equation 1 is estimated for 16–19-year-olds and 20–24-year-olds, following the usual focus in minimum wage research on these groups. They are most likely to be adversely affected by minimum wages because they (especially teenagers) have generally accumulated few skills and therefore are strongly overrepresented among minimum wage workers. Observations within state-year cells for different single-year age groups may be nonindependent, as, for example, state-level economic conditions affect age groups similarly, and because of overlapping samples in the CPS. To allow flexibly for nonindependence over time and across single-year age groups (which could stem from serial correlation, overlapping samples, and common shocks), we report standard errors that are robust to arbitrary correlation patterns among all observations for each state—that is, across age or time—as well as arbitrary heteroskedasticity across states.

We then turn to estimation of the longer-run effects of exposure to minimum wages at ages 16–19 and 20–24 on 25–29-year-olds. We compute the log of the average effective minimum wage to which an individual in a state-year-age cell was

4. Given that federal minimum wage coverage was nearly universal by 1979 (Brown 1999)—or by 1985 if account is taken of coverage of state and local government workers—our estimates should largely identify the effects of changes in minimum wage levels, rather than coverage.

exposed in each of three periods: ages 16–19, ages 20–24, and ages 25–29. (We always compute this only up to the current age; for example, for a 17-year-old we would use the minimum wage faced at ages 16 and 17.) We then estimate the following equation for 25–29-year-olds:

$$(2)\quad Z_{ijt} = \alpha + \gamma_1 MWEXP^{1619}_{ijt} + \gamma_2 MWEXP^{2024}_{ijt} + \gamma_3 MWEXP^{2529}_{ijt} + S_i\theta_S + Y_t\theta_Y + A_j\theta_A + \varepsilon_{ijt},$$

where $MWEXP^{1619}$, $MWEXP^{2024}$, and $MWEXP^{2529}$ measure exposure in the indicated age range. The inclusion of year effects removes the influence of common movements in the exposure variable generated by variation in the federal minimum. The inclusion of state effects implies that the effects of exposure to a higher minimum are identified from differences across cohorts within the same state; for example, a state that pursued high minimum wages and other bad economic policies leading to lower employment over a long period would not generate a spurious effect of exposure to high minimum wages. In addition, because Equation 2 (and Equation 1) is estimated for separate age groups, it allows for differences across states in the age profiles of the dependent variables, and shifts in the age profiles of the dependent variables over time. The motivation for Equation 2 is straightforward. Any consequences of minimum wages—reducing employment directly, lowering training, and so on—are likely to be more severe at young ages when the minimum wage is more binding. Equation 2 tests whether exposure to higher minimum wages when individuals were young generates longer-run effects.

We do not study the longer-run effects of minimum wages for individuals past age 29, because for them, exposure at young ages would have come from the early part of the sample period when there was very little state variation in minimum wages. For example, the latest birth cohort of 34-year-olds in the last year of our sample left its teens by 1987, when most of the state variation in minimum wages began. Even in the absence of this problem, we would get relatively few complete sets of observations on these older cohorts all the way back to age 16.

Finally, we report estimates disaggregating the observations by race (looking at whites and blacks). The effects of minimum wages on minorities may be stronger because their wage levels are lower—whether because of lower productivity or discrimination—and hence a minimum wage is more binding, although the existing literature (mainly older time-series studies) does little to establish stronger disemployment effects for minorities (Brown 1999). Here, though, we are asking a different question about minimum wages and we are using more recent data and state-level variation in minimum wages, so the race difference merits revisiting.

IV. Results

A. Contemporaneous Minimum Wage Effects

Table 2 reports estimated effects of contemporaneous minimum wages, based on Equation 1. The estimates in the first column are consistent with a positive and significant effect of minimum wages on wages of teenagers, emphasizing that minimum wages do substantially increase the price of teen labor; for this double-log

Table 2
Estimated Effects of Current Log of State Minimum

	(1)	(2)	(3)	(4)
	Log(wage)	Percent employed	Hours	Log (weekly earnings)
16–19				
Log effective state minimum wage, current	0.2216**	−9.4008 +	−2.2123	−0.0607
	(0.0693)	(5.1854)	(1.4551)	(0.2390)
R^2	0.78	0.86	0.91	0.91
20–24				
Log effective state minimum wage, current	0.0102	−2.4059	−0.4954	0.0128
	(0.0590)	(2.9786)	(1.4671)	(0.1004)
R^2	0.80	0.64	0.74	0.82
20–24, high school or less				
Log effective state minimum wage, current	0.2075*	−11.3473	−2.9483	−0.0318
	(0.0985)	(7.4197)	(3.5067)	(0.1545)
R^2	0.46	0.49	0.49	0.47

Standard errors, clustered by state, are reported in parentheses. +, *, and ** indicate that estimate is statistically significant at the 10, 5, or 1 percent level. All regressions contain controls for age (single-year age dummy variables), year, and state. State-age-year observations are weighted by the number of observations in the cell, multiplied by the average CPS earnings weight of individuals in the state-year-age cell to correct for oversampling of individuals in small states.

specification, the estimated elasticity is the coefficient estimate. The estimated wage effect for 20–24-year-olds overall is small and statistically insignificant. However, of course, there are fewer individuals in this age group bound by the minimum, and when we focus only on those with lower skills (at most a high school degree), we find a significant positive effect on wages.

The estimates for employment in Column 2 indicate a significant negative employment effect for teenagers. With an average employment rate of 46.5 percent for teenagers, the implied elasticity is −0.20, in line with existing estimates of the elasticity of teen employment with respect to minimum wages. The estimate for 20–24-year-olds overall is not statistically significant, but it is negative. The hours estimates in Column 3 parallel the employment effects, with the estimates indicating a significant negative effect only for teenagers (an elasticity of −0.19). The estimated coefficients for 20–24-year-olds with a high school degree or less are more strongly negative, although still insignificant. Finally, Column 4 looks at weekly earnings. For teenagers especially, there are anticipated offsetting effects as higher wages compete with lower employment or hours. In fact, this is borne out in the estimates, which suggest no effect for teenagers or the other age groups.

The estimates in Table 2 point to contemporaneous effects of minimum wages only on employment and hours of teenagers. This does not imply that there are not other adverse effects from minimum wages experienced by those aged 20–24, especially

Table 3
Estimated Effects of Log Average Effective State Minimum Wage by Age of Exposure

	(1) Log(wage)	(2) Percent employed	(3) Hours	(4) Log (weekly earnings)
25–29				
Log average effective state minimum wage, 16–19	−0.2150**	−5.7487*	−2.7991*	−0.3024**
	(0.0485)	(2.7085)	(1.3059)	(0.0682)
Log average effective state minimum wage, 20–24	−0.1894**	−11.0518**	−6.6298**	−0.3807**
	(0.0456)	(2.6619)	(1.3428)	(0.0726)
Log average effective state minimum wage, 25–29	0.0351	−1.6490	−1.0418	0.0010
	(0.0450)	(2.2380)	(1.1492)	(0.0692)
R^2	0.77	0.48	0.53	0.71
Observations	4,590	4,590	4,590	4,590

See notes to Table 2.

given that we do find that minimum wages raise wages of less-skilled 20–24-year-olds. For example, Neumark and Wascher (2001) report stronger adverse effects of minimum wages on training of 20–24-year-olds than teenagers, and evidence presented later in this paper suggests that facing higher minimum wages in the older age range reduces completed schooling. These effects on training and schooling of those in their early 20s are not surprising, as these are ages at which jobs are more likely to entail training (Neumark and Wascher 2001) and at which many individuals are still on the margin between staying in or leaving school. Thus, longer-run adverse effects of minimum wages could stem from exposure in the teens or the early 20s.

B. Exposure at Different Ages

Estimates of Equation 2, examining the longer-run effects of exposure to high minimum wages, are reported in Table 3. For wages, the effects of exposure at ages 16–19 and 20–24 are negative and statistically significant. The difference between states with and without higher contemporaneous minimum wages is about 0.06 log points (Table 1). Thus, the estimates for wages imply, for example, that exposure to the average higher minimum wage at ages 16–19 reduces adult wages by 1.3 percent ($0.06 \cdot 0.215$). The results for employment and hours also point to adverse longer-run effects of exposure to a high minimum wage when younger. Finally, in Column 4, the estimated longer-run effects on earnings for exposure, both as a teenager and a young adult, are negative and statistically significant for 25–29-year-olds. For example, exposure to the average higher minimum wage as a teenager is estimated to reduce adult earnings by 1.8 percent, and similar exposure as a 20–24-year-old to reduce earnings by 2.3 percent.

The general pattern in these estimates is that exposure to higher minimum wages at younger ages has adverse longer-run effects on labor market outcomes. The findings suggest that the longer-run adverse effects of exposure to minimum wages as a young adult may be more attributable to the lasting impact of effects of minimum wages on training and schooling than on employment or hours, since—as shown in Table 2—there is little evidence of the latter effects for 20–24-year-olds. Of course, we expect that these results are generated among those more bound by the minimum wage at younger ages, evidence of which we address next.

C. Effects of Exposure by Race

Table 4 reports descriptive statistics and regression results for whites and blacks. Average wages are lower for blacks, especially at the older ages, as are employment, hours, and earnings. Estimates of Equation 1 for teenagers shed some light on race differences in minimum wage effects in these data using a specification paralleling much of the existing literature. The estimates are consistent with minimum wages being more binding for black teenagers, with a larger positive point estimate on wages of blacks, and larger negative point estimates on employment and hours of blacks. Stronger contemporaneous minimum wage effects for black teenagers make it more likely that exposure to a higher minimum wage in the early years in the labor market will have more adverse longer-run effects for them.[5]

Estimates of Equation 2, in Panel B of Table 4, point quite clearly to more adverse longer-run effects of minimum wages for blacks. For blacks, exposure to a higher minimum wage during ages 16–19 or 20–24 is associated with significant negative reductions in wages, employment, hours, and earnings. The estimates for whites are often about one-quarter to one-third as large, although still generally statistically significant.

The results by race are inherently interesting given worse labor market outcomes for blacks. In addition, though, by identifying two groups that should be differentially affected by longer-run exposure to high minimum wages, and finding evidence of stronger effects on the group for whom this would be expected (that is, blacks), the race results bolster a causal interpretation of our evidence on the longer-run effects of minimum wages. Essentially, the race differences provide a third level of differencing, relative to the difference-in-differences identification strategy that relies solely on the variation in exposure to minimum wages.

We might expect parallel evidence if we disaggregate the sample based on abilities related to educational attainment, with stronger effects of exposure to a high minimum on those with lower abilities—especially given the earlier results on contemporaneous effects of minimum wages on wages of less-educated 20–24-year-olds. There is some evidence consistent with this (not reported in tables). However, such evidence is complicated by the fact that education may itself be influenced by exposure to a higher minimum wage, and that skill levels in jobs held by young workers may not be so closely related to eventual education.

D. Exposure to Differing Economic Conditions

The history of economic conditions to which one was exposed as a youth may also affect subsequent labor market outcomes, and if this history is correlated with the

5. The contemporaneous effects for black young adults (not reported in table) are also indicative of stronger disemployment and hours effects, although these estimates are not significant.

Table 4
Estimated Effects of Current State Minimum and Average State Minimum Wage by Age of Exposure, by Race

	White				Black			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log (wage)	Percent employed	Hours	Log (weekly earnings)	Log (wage)	Percent employed	Hours	Log (weekly earnings)
A. Contemporaneous specification								
16–19								
Mean of levels of dependent	6.56	0.499	12.81	92.17	6.48	0.291	8.91	62.92
variables (standard deviations)	(0.99)	(0.146)	(6.04)	(52.11)	(1.99)	(0.254)	(7.79)	(69.01)
Log effective state minimum	0.2066**	−9.6879*	−1.7986	−0.0104	0.2954*	−11.1330	−2.8317	0.0215
wage, current	(0.0762)	(4.7510)	(1.3699)	(0.2168)	(0.1367)	(7.0460)	(2.0275)	(0.6204)
R^2	0.77	0.83	0.91	0.90	0.40	0.51	0.61	0.62
Observations	4,677	4,677	4,677	4,677	3,211	3,211	3,208	3,208

B. Exposure specifications								
25–29								
Mean of levels of dependent variables (standard deviations)	12.62 (1.96)	0.806 (0.681)	32.58 (3.39)	425.72 (86.45)	10.76 (3.08)	0.689 (0.245)	28.36 (8.89)	314.31 (142.31)
Log average effective state minimum wage, 16−19	−0.2178** (0.0508)	−0.3870 (2.7329)	−0.3206 (1.3556)	−0.2376** (0.0700)	−0.5349** (0.1228)	−32.1744** (8.9942)	−16.4728** (3.7619)	−1.0828** (0.2037)
Log average effective state minimum wage, 20−24	−0.1872** (0.0493)	−7.0702* (2.7535)	−4.8671** (1.4209)	−0.3267** (0.0758)	−0.4864** (0.1108)	−26.8465** (7.7896)	−15.1759** (3.3653)	−0.9812** (0.1788)
Log average effective state minimum wage, 25–29	−0.0010 (0.0524)	−0.9717 (2.3156)	−0.5264 (1.1771)	−0.0190 (0.0749)	0.0046 (0.0978)	−4.1159 (7.1327)	−1.5088 (2.9712)	−0.0437 (0.1537)
R^2	0.74	0.46	0.50	0.68	0.46	0.29	0.34	0.36
Observations	4,590	4,590	4,590	4,590	3,620	3,620	3,612	3,612

Specifications in Panel A correspond to Table 2. Specifications in Panel B correspond to Table 3. See notes to Table 2 and 3. Mean wages, hours, and earnings are in levels rather than logs. Samples are sometimes smaller because of absence of white or black respondents in a cell.

Table 5
Robustness Analyses, 25–29-year-olds

	(1)	(2)	(3)	(4)
	Log(wage)	Percent employed	Hours	Log (weekly earnings)
A. Including unemployment rate exposure				
Log average effective state minimum wage, 16–19	−0.0829+	−1.0426	−0.4219	−0.1012*
	(0.0463)	(2.8212)	(1.3118)	(0.0617)
Log average effective state minimum wage, 20–24	−0.1468**	−7.6701**	−4.8380**	−0.2908**
	(0.0459)	(2.7586)	(1.3528)	(0.0720)
Log average effective state minimum wage, 25–29	−0.0340	−4.2832+	−2.3793*	−0.1072
	(0.0428)	(2.2731)	(1.1284)	(0.0660)
Average unemployment rate, 16–19	−0.0061**	0.0904	0.0590+	−0.0049**
	(0.0012)	(0.0734)	(0.0348)	(0.0017)
Average unemployment rate, 20–24	−0.0161**	−0.4409**	−0.2170**	−0.0226**
	(0.0015)	(0.0760)	(0.0354)	(0.0019)
B. Including state-specific line and quadratic time trends				
Log average effective state minimum wage, 16–19	−0.1020+	−5.3095+	−2.6515+	−0.1656*
	(0.0548)	(2.8512)	(1.3548)	(0.0740)
Log average effective state minimum wage, 20–24	−0.1103*	−10.2350**	−6.5037**	−0.2768**
	(0.0517)	(2.8148)	(1.3792)	(0.0751)
Log average effective state minimum wage, 25–29	0.0877*	−0.6421	−0.4131	0.0739
	(0.0388)	(2.0890)	(1.0150)	(0.0584)

See notes to Table 3. The sample is smaller in the top panel because prior to 1979 smaller states were not separately identified in the CPS and therefore unemployment rates by state are not always available.

minimum wage to which one was exposed, then the foregoing estimates may be biased. We examine this by adding controls for exposure to unemployment rates to Equation 2, constructed the same way as the minimum wage histories.[6] The estimates in Panel A of Table 5 indicate that the history of unemployment rates to which individuals were exposed does impact contemporaneous outcomes. In six out of eight cases higher past unemployment rates have negative and significant estimated effects on the dependent variables; the only exception is the weakly significant positive effect of exposure at ages 16–19 on hours, but this is much smaller than the strongly significant negative effect of exposure at ages 20–24. Moreover, the estimated effects of exposure to a higher minimum wage fall somewhat as a result of the inclusion of the unemployment history.

6. We omit current unemployment rates to avoid endogeneity.

Differing economic conditions also could influence the results if there are longer-term changes in state economic conditions that happen to be correlated with higher minimum wages—such as faster economic growth in Sunbelt states coupled with the absence of higher minimum wages in those states. To address this possibility, we augment the baseline specification from Table 3 with state-specific linear and quadratic time trends, in Panel B of Table 5. As the table indicates, the estimates are essentially the same as those in the preceding panel.

Another relevant set of influences on young adults' labor market experiences is changes in welfare and taxes. The latter part of the 1990s witnessed sharp changes in welfare and tax policy that strongly affected work incentives among single mothers. It is unlikely that these drive our results. For 25–29-year-olds, very little identifying information comes from the late 1990s, as the sample ends in 2001 and we are estimating the effects of minimum wages many years earlier. Also, if the minimum wage effects we have found thus far reflect effects of changes in these other policies, we might expect quite different results for men and women, with the effects more apparent for women. But the evidence of longer run effects of minimum wages was relatively similar for males and females, and if anything somewhat stronger for males.

E. The Minimum Wage History and Migration

Because the minimum wage history we use to measure exposure is based on the current state of residence, as we look further back in time from the CPS observation on each individual, the history is likely to be more error-ridden, and the estimated effects of exposure more biased toward zero. Thus, the evidence of negative effects of past exposure to higher minimum wages seems unlikely to be attributable to this measurement error.

Another possible source of bias pertaining to the minimum wage history is the endogenous choice of the current state of residence. Insofar as this choice is related to minimum wages, we would expect that individuals move to offset adverse effects of minimum wages or to take advantage of beneficial effects; that is, migration should arbitrage away some of the costs or benefits of higher minimum wages. Thus, for example, less-skilled teenagers or young adults in states with high minimum wages might be more likely to move to lower minimum wage states to try to offset whatever adverse effects would be generated by exposure to a high minimum wage. A migration pattern like this would tend to understate negative effects of exposure to a higher minimum wage, given how we measure this exposure; another way to think about this is simply that endogenous migration generates a positive correlation between skill and minimum wages. Again, then, this source of bias seems unlikely to account for our findings.

However, to get some direct evidence on migration and skill, we used data from the 1990 and 2000 Census of Population PUMS files, which include information on characteristics related to skill or wages, age, and mobility between states over the past five years. We looked at those aged 25–29 in 1990 or 2000, who were therefore young adults five years earlier, and identified those who had changed states of residence since five years ago; the share of such movers is 16 percent. We then matched these records to the effective minimum wage by state and year, and estimated regressions of the change in the minimum wage associated with interstate migration on race, sex, ethnicity, and an indicator for education less than a high school degree.[7]

The estimates indicated that with respect to education, sex (in the 1990 data), and race (in the 2000 data), characteristics associated with lower wages and skills are also associated with moves to states with lower minimum wages. For these cases, then, the evidence is consistent with the conjecture that lower-wage or lower-skill workers, when they move, migrate to states with lower rather than higher minimum wages—a migration pattern that would if anything bias our estimates against finding adverse effects of earlier exposure to a high minimum wage. Some results go the other way, however, in particular for Hispanics in both years, and for race in the 1990 data. (Of course, the underlying story for Hispanics is potentially more complex because of the possible continuation of migration patterns beginning with migration into the United States.) The mixed evidence implies that there is no reason to believe that endogenous migration leads to overly strong adverse impacts of exposure to high minimum wages at young ages.

F. Accounting for the Longer-Run Effects of Minimum Wages

The key evidence points to longer-run negative effects on earnings of exposure to higher minimum wages at earlier ages when minimum wages were more likely to have been binding. It is instructive to think about the magnitudes of the estimated earnings effects reported in Tables 3 and 5, to try to understand what might underlie the adverse longer-run effects of minimum wages that we find, and to assess whether the magnitudes are plausible. If we use averages of the estimates in Table 5, and the same 0.06 log point differential associated with exposure to a higher minimum that we referred to earlier, then the estimates imply that exposure to this higher minimum wage through the teen years reduces average earnings of 25–29-year-olds by 0.8 percent, and exposure during the 20–24 period reduces average earnings of 25–29-year-olds by 1.7 percent. The combined 2.5 percent reduction stemming from exposure throughout these years (relative to no exposure) seems like a large effect, and it is therefore important to ask how much of it can be potentially explained by the different types of minimum wage effects suggested by the estimates reported in this paper or elsewhere in the existing literature.

The estimates point to foregone labor market experience stemming from disemployment effects in earlier periods. The estimated contemporaneous effect of minimum wages on 16–19-year-olds from Table 2 implies that exposure to a higher minimum reduces employment by 1.2 percent, and the estimate for 20–24-year-olds (although not significant) implies a reduction of 0.2 percent. Treating a lower employment probability as generating proportionally fewer years of employment, and assuming that each year of full-time experience is worth, say, 4 percent higher wages, this implies 0.224 percent $(0.04 \cdot 0.012 \cdot 4 + 0.04 \cdot 0.002 \cdot 4)$ lower earnings. Thus, this back-of-the envelope calculation suggests that foregone experience can account for 8.9 percent (0.224/2.5) of the overall earnings reduction from exposure to a higher minimum.

7. We do not consider nonmovers, because we suspect that for most individuals staying in the same state has nothing to do with policy changes, and we want to avoid the relationship between wage- or skill-related measures and changes in the minimum wage that arise simply because of changes in the minimum wage in the state in which one resides.

Table 6
Estimated Effects on Schooling, 25–29-Year-Olds

	(1)	(2)
	Percentage with high school degree	Years of schooling
Log average effective state minimum wage, 16–19	−7.0313**	−0.8145**
	(2.2168)	(0.2093)
Log average effective state minimum wage, 20–24	−7.4778**	−1.1940**
	(2.4633)	(0.2385)
Log average effective state minimum wage, 25–29	0.7907	−0.0359
	(2.3264)	(0.2185)
R^2	0.61	0.79
Observations	4,590	4,590

See notes to Table 3. For 1979–91 high school degree is based on years of schooling, and for 1992–2001 on whether a high school diploma (or equivalent) was earned.

Accounting for tenure would be expected to increase this effect, although the effect would likely be relatively small because young workers change jobs frequently.

The negative longer-run effects of minimum wages could also occur through decreased skill accumulation. There is evidence from CPS data that minimum wages reduce formal training for 20–24-year-olds (Neumark and Wascher 2001, Table 3), with the estimates implying that a representative higher minimum (using the 0.06 figure from above) reduces the incidence of training by about 0.9 percentage points, or about 9 percent. With an estimated return to this training of about 18 percent, this implies an additional 0.16 percent (0.18·0.009) reduction in the average wage;[8] because this estimate comes from a sample that conditions on employment, given the employment rate for this age group this would translate into 0.13 percent reduction in average earnings, accounting for an additional 5.2 percent of the earnings decline.

Another avenue for skill reduction stemming from higher minimum wages comes through school enrollment. Here, rather than relying on past findings, we can simply adopt our regression framework to assess directly the longer-run effects of exposure to a higher minimum on schooling. As reported in Table 6, looking at both the percentage with a high school degree or more, and years of schooling, the estimated effects of exposure as a 20–24-year-old (as well as a teen) on schooling of 25–29-year-olds are negative and statistically significant. Using the years of schooling estimate, the coefficients imply that the combined effect of exposure to a higher minimum is to reduce schooling by 0.121 years, which multiplied by a return to schooling of 0.08 implies an average 1 percent reduction in earnings conditional on employment, or 0.8 percent unconditionally, accounting for 32 percent of the earnings reduction.

8. The training estimates used in this calculation are from Table 3 (average for Column 2′), Table 2 (Column 2), and Table A1 (Column 2) of Neumark and Wascher (2001).

Thus, if we accumulate the effects of foregone experience, lost training, and less schooling, a combination of our evidence and estimates from other studies suggests that these channels can account for 1.15 of the 2.5 percent lower earnings stemming from exposure to a higher minimum wage, or 46 percent of the effect. The calculations are only suggestive, but they indicate that it is at least plausible that exposure to a higher minimum wage as a teenager and young adult can generate the longer-run effects of minimum wages of which we find evidence.

The estimates thus far are based on links between minimum wages and longer-run effects that the human capital model suggests are important. In addition, the evidence in Table 5 indicates that past exposure to a high minimum wage, at ages 20–24, also leads to lower employment and hours at ages 25–29, perhaps because the lower wage to which exposure to a higher minimum leads (as suggested by the evidence) reduces labor supply. (Including the labor supply effects is not double counting because the foregoing calculations were based on effects on wages.) Using the average of the unconditional hours estimates, which account for both hours and employment effects, the estimated effect on hours implies a 1.07 percent reduction in unconditional hours and hence a similar reduction in earnings. Thus, the contemporaneous labor supply effect could account for a good share of the unexplained part of the earnings decline.

The estimates discussed in this subsection are only suggestive, and they are based on some relationships about which there is disagreement (such as the effects of minimum wages on training). Nonetheless, it is interesting that they can largely account for the longer-run effects of minimum wages on earnings suggested by our regression analysis. There may also be additional influences generating the longer-run effects of minimum wages, such as the scarring effects of early nonemployment that deter the formation of good work habits, a reputation as a good worker, and labor market networks. These calculations, of course, do not prove that our interpretation of the evidence is the right one, but at a minimum, they emphasize the potential importance of thinking about the longer-run effects of minimum wages.

In addition, the longer-run effects of minimum wages that we find are qualitatively consistent with work by Mroz and Savage (2006) indicating that—after accounting for heterogeneity that may generate a correlation between individuals' employment experiences at different ages—early spells of unemployment experienced by youths result in wage declines that taper off only slowly over time, lowering wages as much as 10 years later (despite some increased training and work activity to mitigate the effects of earlier unemployment). Although Mroz and Savage do not focus on minimum wage effects, and the effects of minimum wages that we find are not limited to those acting through lowered employment among teens and young adults, there is substantial overlap in the finding that factors generating worse youth labor market outcomes can have longer-lasting negative effects.

IV. Conclusion

We study whether exposure to minimum wages at young ages leads to longer-run effects on labor market outcomes. Adverse longer-run effects could arise because of decreased labor market experience and accumulation of tenure, diminished training and skill formation (including schooling), lower current labor supply, and other influences. If minimum wages have longer-run negative effects, then an exclusive focus on short-run effects of minimum wages on youths—which characterizes nearly all of the existing research and policy debate on minimum wages—fails to capture a potentially harmful effect of minimum wages and one that may be more important from a policy perspective, both because the effects are persistent and because they fall on older individuals who are more likely to be primary breadwinners in their families.

We estimate the longer-run effects of minimum wages by using information on the minimum wage history that workers have faced since potentially entering the labor market at age 16. The evidence indicates that as individuals reach their late 20s, they earn less (and work less) the longer they were exposed to a higher minimum wage as a teen and young adult. Furthermore, the adverse longer-run effects of exposure to higher minimum wages when young are stronger for blacks, presumably reflecting in part, at least, the greater extent to which minimum wages are binding for blacks. Finally, using a combination of other results from our data and outside estimates, it appears that the channels of influence of earlier exposure to minimum wages that we have identified can account for a sizable share of the longer-run effects indicated by our regression analysis.

Our evidence is suggestive of a potentially important, and until now unexplored, effect of minimum wages. It will be difficult to establish more firmly the causal effect of exposure to minimum wages when young on later labor market outcomes, and to understand more fully how these effects arise. But the potential reorientation of how researchers and policymakers might think about minimum wages if there are such longer-run effects suggests that efforts to study these longer-run effects may prove very fruitful.

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