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# ABSTRACT

# The Effect of Minimum Wages on
# Immigrants' Employment and Earnings[*]

This study examines how minimum wage laws affect the employment and earnings of low-skilled immigrants and natives in the U.S. Minimum wage increases might have larger effects among low-skilled immigrants than among natives because, on average, immigrants earn less than natives due to lower levels of education, limited English skills, and less social capital. Results based on data from the Current Population Survey for the years 1994-2005 do not indicate that minimum wages have adverse employment effects among adult immigrants or natives who did not complete high school. However, low-skilled immigrants may have been discouraged from settling in states that set wage floors substantially above the federal minimum.

JEL Classification:    J23, J38, J15

Keywords:    immigrants, minimum wage, low-skilled

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**The Effect of Minimum Wages on Immigrants' Employment and Earnings**

The federal minimum wage increased to $5.85 from $5.15 in July 2007—the first

increase in the federal wage floor in a decade—and will rise in two additional 70-cent increments

over the next two years, reaching $7.25 an hour in July 2009. These increases bring new

urgency to the debate over how minimum wages affect the labor market outcomes of low-skilled,

low-wage workers. Heightening the urgency is the fact that an increasing number of states took

matters into their own hands and imposed or raised state-level wage floors in recent years.

Before the federal minimum wage rose in July 2007, 31 states and the District of Columbia had

minimum wages that exceeded the federal rate of $5.15, which had been in effect since 1997.

Standard competitive economic models predict that higher minimum wages result in less

employment. Despite this prediction, recent research has reached disparate conclusions about

the impact of minimum wage increases on employment.

Most studies of minimum wages in the U.S. examine the effect of the minimum wage on

employment among groups that earn relatively low wages, such as teenagers and fast food

workers. Neumark and Wascher (2006) provide a survey of this literature. The fastest-growing

low-wage, low-skilled group, however, is made up of immigrants (Sum et al., 2002). As of

2005, about 32% of foreign-born adults (aged 25 and older) in the U.S. do not have a high school

diploma or equivalent. These immigrants account for about one-third of the total adult

population without a high school diploma. The foreign-born comprise almost two-thirds of

adults with less than a fifth-grade education and half of adults with at most an eighth-grade

education (Census Bureau, 2006). Because of differences in age and labor force participation

rates, immigrants compose an even more disproportionate share of the low-skilled labor force: almost 44% of adults in the labor force who lack a high school diploma are foreign-born.

Despite the increasing share of the low-skilled labor force represented by foreign-born workers, virtually no research has investigated how minimum wages affect this group. The present study is our attempt to fill this gap. Using data from the period 1994-2005, we compare the effect of minimum wages on employment, hours worked, and earnings among adult immigrants and natives in the U.S. who did not have a high school diploma. For purposes of comparison with previous research, we also present results for teenagers.

The impact of minimum wages on immigrants is important not only because of the size and rapid growth of the low-skilled foreign-born workforce but also because the impact on the foreign-born might be greater and longer-lasting than the effect on U.S.-born workers. Many of the native-born workers who earn near the minimum wage are teens or young adults, most of whom will experience substantial earnings growth as they age (Even and Macpherson, 2000, 2004). A large number of adult immigrants who have little education may, in contrast, be mired in low-wage jobs for their entire working lives. The level of the minimum wage and its effect on earnings and employment therefore may play a large role in the standard of living, rate of assimilation, and settlement patterns of many low-skilled immigrants.

**Theoretical Overview**

Conventional economic theory predicts that higher minimum wages lead to higher average earnings and lower employment-to-population rates. The effects should be largest among groups that earn near the minimum wage, groups that are likely to include youths and low-skilled adults. However, some research suggests that higher minimum wages are not

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necessarily associated with lower employment rates even though they boost average hourly earnings among workers (e.g., Card 1992a, 1992b; Card, Katz, and Krueger, 1994; Card and Krueger, 1994; Katz and Krueger, 1992). Potential explanations for these results include imperfectly competitive labor markets, decreases in hours worked per worker instead of in the number of workers, and improvements in the quality and productivity of workers that offset the effects of higher wage mandates. For example, employers might substitute more-skilled workers for less-skilled workers as the wage floor increases, resulting in no net change in aggregate employment but changes across subgroups. Another possibility is that employment rates based on surveys of individuals remain unchanged despite minimum wage increases because some individuals work "under the table" for wages below the legal wage floor. Individuals could be pushed into subminimum wage jobs when the wage floor rises, or they could already be working for less than the legal minimum and not be affected by increases in the minimum wage.

From a theoretical standpoint, the impact of minimum wages is likely to be larger among the foreign-born than among natives.[1] Immigrants on the low end of the skill distribution tend to have fewer years of education, less institutional knowledge, and worse English language skills than low-skilled natives. Commensurate with these differences, foreign-born workers who do not have a high school diploma earn 14% less than natives with similarly low educational attainment, and immigrants with a high school diploma earn 18% less than high-school-graduate natives (Economic Report of the President, 2005). Low-wage immigrants, particularly those from non-English speaking countries, have considerably lower returns to education and less U.S. labor market experience than low-wage natives (Chiswick et al., 2006). If immigrants are less productive than natives within the low-skilled group, then standard economic theories predict

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[1] We use the terms 'immigrant' and 'foreign-born' interchangeably in this article to refer to persons born outside the U.S. to parents who are not U.S. citizens. The data that we use do not allow us to distinguish between illegal immigrants, legal permanent residents, and temporary migrants.

that immigrants should experience more adverse employment effects than natives when minimum wages increase.[2]

However, there are also reasons why employment effects could be smaller for immigrants than for natives. If immigrants are more likely to work in industries with less elastic labor demand or to work off-the-books, then minimum wage increases might have *less* of an effect on employment among immigrants than among natives. In particular, the presence of a substantial number of undocumented workers among the foreign-born labor force may boost the incidence of subminimum wages in the immigrant population.[3] Employers who are already breaking the law when (knowingly) hiring undocumented workers may also be more willing to flout other labor regulations, such as minimum wage laws. Although covered by minimum wage laws, undocumented workers paid less than the minimum wage are probably unlikely to seek legal redress for fear of revealing their undocumented status.

We are not aware of any previous research examining whether there are differences between immigrants and natives in the U.S. in the effects of minimum wages on employment and hours worked. Stylized facts suggest that immigrants are more likely to be affected by minimum wages than are natives. Results in Butcher and DiNardo (2002) and Chiswick, Le, and Miller (2006) suggest that the minimum wage compresses the bottom of the wage distribution more among immigrants than among natives. A recent Organization for Economic Cooperation and Development (OECD) study finds significantly more adverse effects of minimum wages and other labor market regulations on immigrants than on natives in a cross-section of OECD nations (Jean, 2006). In particular, higher minimum wages reduce female economic activity and male

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[2] For formal models of the varying effects of minimum wage increases across skill levels, see, for example, Connolly (2003) and Lang and Kahn (1998).
[3] Mehta et al. (2002) indicate that about 10% of undocumented immigrants (and 3% of documented immigrants) interviewed in the Chicago area in 2001 reported being paid less than the minimum wage.

employment rates more among the foreign-born than natives. Orrenius and Solomon (2006) found that the unemployment rates of immigrants—particularly young immigrants—relative to natives are higher in OECD countries with more labor market restrictions than in those with fewer such regulations. They also concluded that immigrants have relatively low employment rates compared with natives in countries with more labor market regulations.

**Data**

We use annual state-level data to examine how minimum wages are related to employment-to-population rates, average weekly hours worked, and average hourly earnings among the employed during the period 1994 to 2005. Our measure of the minimum wage is the annual average of the higher of federal and state minimum wages (the "effective minimum wage") in each state. For simplicity and comparability to most previous studies, the analysis does not incorporate legal subminimum wages (which apply to young or recently-hired workers under the current federal law and some state laws); industry- or occupation-specific minimum wages (such as the tip credit minimum wage for some restaurant workers); city-level wage floors (which occurred in a few areas toward the end of our sample period); or "living wage" requirements.[4] The federal minimum wage increased twice early in our sample period, from $4.25 to $4.75 in October 1996 and to $5.15 in September 1997. The number of states with a minimum wage above the federal level at some point during the year ranges from a low of 8 in 1998 to a high of 17 in 2005. Appendix Table 1 lists which states exceeded the federal minimum wage each year during our sample period.

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[4] We also do not control for changes in the Earned Income Tax Credit (EITC) or for welfare reform, which might affect low-skilled workers' incentive to work. The year fixed effects capture any national-level effects of changes in such factors. See Neumark and Wascher (2007) for a study that combines the effects of minimum wages and the EITC among teens and young adults.

Our employment, hours, and earnings measures are based on data from the Current Population Survey outgoing rotation groups (CPS ORG) during 1994-2005.[5] The CPS is a monthly survey of about 55,000 nationally-representative households that focuses on labor market activity. Housing units are in the sample for four months, out for eight months, and then back in the sample for four months. When a housing unit is in the fourth and eighth survey waves (the outgoing rotation), the survey asks about individuals' earnings as well as about their employment status and hours worked.

We focus on three groups: less-educated adult natives, less-educated adult immigrants, and all teens (ages 16-19). Less-educated adults here are individuals aged 20-54 who do not have a high school diploma or its equivalent. Immigrants are individuals who report being born outside the U.S. and not being a U.S. citizen at birth.[6] We report results for teens to provide a benchmark for comparison with much of the minimum wage literature. Because of the small sample sizes for foreign-born teens in many states (most immigrants arrive in the U.S. when they are adults, not as children), we do not stratify the teen data by nativity.

We present results for data stratified by sex as well as for the combined sexes because of concerns that immigrant women's labor force participation may differ from immigrant men's (e.g., Schoeni, 1998). As discussed below, examining the sexes separately yields some interesting results for teens as well as for less-educated adults. Previous research that examines changes in the federal minimum wage finds evidence of adverse employment effects only among male teens (Bernstein and Schmitt, 1998; Neumark and Wascher, 2007), a result we corroborate.

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[5] Our approach implicitly assumes that representation of low-skilled immigrants (and natives) in the CPS does not change in response to changes in the minimum wage. If increases in the minimum wage drive the least-skilled workers into subminimum wage jobs and "into the shadows (and out of the CPS)," as hypothesized by Cortes (2004: 10), then our results probably would be biased toward not finding effects of the minimum wage. However, Cortes finds no evidence in support of that hypothesis.

[6] This approach does not count individuals born in Puerto Rico or other outlying areas of the U.S. (who are U.S. citizens at birth) as immigrants. Because such individuals are likely to differ substantially from individuals born in the U.S., we exclude them from the data entirely.

We constructed annual state-level employment-to-population rates for these populations and state-level average hourly earnings among workers in these groups.[7] We also constructed average usual hours worked per week among all individuals and among only workers. The questions in the CPS ORG from which we constructed our measures concern employment, hours, and earnings during the survey week, not during the previous year. We deflated earnings and the minimum wage using the annual average of the consumer price index for urban wage earners (CPI-W).

As Table 1 shows, 1.4% of workers earn exactly the effective minimum wage, 3.3% earn less than the minimum wage, and 8.5% earn above the wage floor but within 125% of the minimum wage. The fractions of workers earning exactly, less than, and slightly above the minimum wage are all higher among immigrants than among natives, higher among teens than among low-skilled adults, and higher among women than among men within age/education and nativity groups. For example, the shares of low-skilled adult immigrants who earn exactly, less than, and slightly more than the minimum wage are 5%, 7.6%, and 20.6%, respectively, versus 2.4%, 5.2% and 15.6% for natives. Increases in the minimum wage therefore should have a larger impact among low-skilled immigrants than among low-skilled natives, assuming compliance with the law. The wage distributions in Table 1 also suggest that minimum wage effects should be larger among teens than among low-skilled adults and larger among women than among men.

The finding that immigrants are more likely than natives to earn less than the minimum wage accords with some previous research. Using 1994 CPS ORG data, Trejo (1998) notes that

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[7] We used the survey population weights to construct the employment rates and average hours and the outgoing rotation group weights to construct average earnings. The earnings sample includes both workers paid hourly and workers paid at other frequencies; we calculated average hourly earnings for the latter as usual weekly earnings divided by usual weekly hours. We used the labor force status recode to determine employment status.

5.5% of immigrants and 3.8% of natives earn less than the federal minimum wage. However, Fry and Lowell (1997) report that immigrants are less likely to earn below the federal minimum wage than natives (2.3% versus 2.9%) in June 1988 and November 1989 CPS data. The difference may be due in part to declines in immigrant "quality" across cohorts, as discussed by Borjas (1985, 1995), since we use more recent data. In addition, our analysis incorporates state minimum wages that were above the federal level. This raises the effective minimum wage in several key states that have disproportionately large numbers of immigrants, most notably California.

Figure 1 shows the cumulative distribution of hourly earnings among low-skilled natives and immigrants and among all teens. As the descriptive statistics suggest, teens are considerably more likely to earn near the minimum wage than low-skilled adults. Among low-skilled adults, immigrants have a lower earnings distribution than natives. The figure suggests that relatively few low-skilled adult native workers are likely to be affected by minimum wage increases. During the period 1994-2005, the average increase in nominal minimum wages was less than 10% of the initial level; the federal increases that occurred in 1996 and 1997 were about 12% and 8% of the initial levels, respectively. Few adult natives, even among those who do not have a high school diploma, earn little enough to have been affected by such small increases in the wage floor.

The various age/education and nativity groups we examine exhibit differences in employment rates as well as in earnings, as shown in the last column in Table 1. Although immigrants and natives as a whole both have employment-to-population rates of about 0.63, less-educated immigrants are more likely to be employed than less-educated natives. This difference is driven by males; the employment rate among less-educated adult male immigrants is 18

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percentage points higher than among less-educated adult male natives. Teens have lower employment rates than low-skilled adults. Employment rates are similar among teen males and females.

Low-wage workers are disproportionately young, female, and less-educated as well as disproportionately foreign-born. Table 2 reports average characteristics for low-wage workers and for all workers. While immigrants account for about 13% of all workers during this period, they make up almost 23% of minimum wage workers and 19% and 18% of workers earning below and slightly above the minimum wage, respectively. Teenagers and workers who have not (yet, in some cases) graduated from high school are particularly overrepresented among low-wage workers. However, a substantial fraction of minimum wage workers are not young; almost one-half of low-wage workers are at least 25 years old.

**Methods**

Before examining employment and hours effects, we consider the impact of the minimum wage on average hourly earnings. If we fail to find evidence of positive effects on hourly earnings, there is little reason to expect disemployment effects. Because the federal minimum wage and most state minimum wages are set by legislatures and raised infrequently, inflation erodes the real value of the minimum wage over time, making it less binding.[8] In addition, given variation in wages across areas and sectors, minimum wages are not necessarily binding for all low-wage jobs.

We examine the relationship between real average hourly earnings and the real minimum wage using a basic panel data regression model:

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[8] During the sample period, only Oregon and Washington had state minimum wages indexed to inflation, and those laws were passed during the 2000s. As of 2007, Vermont's minimum wage increases by the smaller of 5% and the inflation rate, and Arizona, Florida and Missouri passed laws indexing their state minimum wages to inflation.)

$$\ln \text{Wage}_{st} = \alpha + \beta \ln \text{MW}_{st} + \gamma \text{BusCycle}_{st} + \sigma S_s + \tau T_t + \varepsilon_{st}, \tag{1}$$

where *s* indexes states and *t* years in annual state-level data. The coefficient on the real minimum wage variable, *β*, gives the elasticity of average hourly earnings with respect to the minimum wage. We estimate the wage model separately for less-educated native workers, less-educated foreign-born workers, and teens in order to examine how groups' average earnings are related to the minimum wage.

Some specifications include controls for state-level economic conditions. We use three controls for the business cycle: the natural log of real gross state product (GSP) per capita, initial unemployment insurance claims, and the real value of permits issued for privately-owned residential construction (single-family homes, apartments, and condominiums). We include these variables as business cycle controls because they are indicators of current or 'coincident' economic activity; in contrast, the unemployment rate, which previous research often used to control for the business cycle, is a lagging indicator of economic activity. If the minimum wage is endogenous with respect to business cycle conditions, with states more likely to raise their wage floor when the economy is booming, then the estimated coefficient on the minimum wage variable in the earnings model tends to be biased upward because wages would be increasing anyway due to economic growth. Including the business cycle controls helps reduce this endogeneity bias.

The empirical model includes state and year fixed effects. The state fixed effects capture any time-invariant factors that affect average wages within each state while the year fixed effects capture any time factors that are common across states, such as the national business cycle.

Because we use the higher of state and federal minimum wages as the minimum wage variable, the model measures the effect of both state-level increases beyond the federal rate and federal increases in states that do not have minimum wages above the federal level. The standard errors are Huber-White corrected and clustered on the state to control for heteroscedasticity. In the earnings regressions, observations are weighted using the sum of the outgoing rotation weights within the state-year-group cell in the CPS ORG data.

The standard model of labor supply and demand posits that the imposition of a binding minimum wage will reduce employment by moving the equilibrium employment level back along the labor demand curve. The higher the minimum wage, the lower the employment level. Minimum wage studies are, in essence, measuring the elasticity of labor demand with respect to wages by using the minimum wage as an exogenous source of variation in wages.

The basic regression model we use to examine employment effects is similar to the earnings model:

$$\ln \text{Emp/Pop}_{st} = \alpha + \beta \ln \text{MW}_{st} + \gamma \text{BusCycle}_{st} + \sigma S_s + \tau T_t + \varepsilon_{st} \qquad (2)$$

where $s$ indexes states and $t$ years in annual state-level data. The left-hand-side variable is the employment rate for a particular age/education/nativity group. The minimum wage variable, *MW*, is the real effective minimum wage. We take the natural log of both variables of interest, the employment rate and the minimum wage, so the estimated coefficients can be interpreted as elasticities. As in the wage regressions, the model controls for the business cycle since it might confound the effect of the minimum wage on employment. The business cycle controls (which are the same as those used in the earnings regression model) also reduce any endogeneity bias

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that would occur if minimum wage increases are cyclical; this would tend to bias up (toward zero) the estimated coefficient on the minimum wage variable in employment models because it would attenuate the negative effect of minimum wage increases. The employment regression model includes state and year fixed effects, and the standard errors are Huber-White corrected and clustered on the state. Observations are weighted using the sum of the survey population weights within the state-year-group cell in the CPS ORG data.

The above model is a reduced form specification that estimates the relationship between the employment rate and the real minimum wage. It does not capture how binding the minimum wage is, i.e. how far it is from the market-determined wage. We therefore also estimate a variant that uses the *relative* minimum wage instead of the real minimum wage. Following Neumark and Wascher (2006) and Keil, Robertson, and Symons (2001), we specify this model as

$$\ln \text{Emp/Pop}_{st} = \alpha + \beta \ln(MW_{st}/\text{Wage}_{st}) + \rho \ln(\text{Wage}_{st}) + \gamma \text{BusCycle}_{st} +$$

$$\sigma S_s + \tau T_t + \varepsilon_{st} \tag{3}$$

which includes both the log of the relative minimum wage and the log of the real average wage. The variable *Wage* is the real average wage among adults aged 20-54 in a state and year; it does not vary across age/education/nativity groups. The goal of this specification is to control for the cost of low-wage workers (who are hired at or near the minimum wage) relative to other workers. As the minimum wage increases relative to the average wage among prime-age workers, employers are expected to substitute more prime-age, skilled workers for relatively younger, less-skilled workers, creating larger disemployment effects.

We use similar models to examine the effect of the minimum wage on average usual weekly hours worked.  For each age/education/nativity group, the hours models are estimated in both a sample restricted to workers and in the entire survey population (which includes non-workers with zero hours worked).  The sample of workers captures whether businesses react to higher minimum wages by increasing hours among remaining workers—such as by substituting full-time workers for part-time workers—or by cutting average hours instead of reducing employment levels.  Those results are best interpreted together with the employment results; finding no disemployment effects but a decline in hours might have different distributional implications from finding a negative employment effect but an increase in hours among individuals who remain employed.  The regressions that include all individuals, not just workers, aim at capturing the effect of the minimum wage on total hours worked, which implicitly incorporates employment effects.

We show the robustness of our main results to using a specification which controls for the business cycle with the unemployment rate, similar to that used by Neumark and Wascher (1992).  This specification sometimes adds a variable measuring the size of the group examined as a fraction of the population aged 16-64 to control for any labor supply or cohort size effects.  We also examine the robustness of our main results for teens to controlling for the fraction of teens enrolled in school.

**Results**

*Earnings Effects*

The regression results suggest that minimum wages boost earnings among low-skilled immigrants and among teens but not among low-skilled natives.[9]  As Table 3 shows, a 10% increase in the minimum wage is associated with a 2.2% increase in average hourly earnings among immigrant men and a 2.4% increase among immigrant women when the model does not control for the business cycle.  As expected, minimum wages are generally procyclical and controlling for state-level economic conditions reduces the estimated effect of the minimum wage; the effect of a 10% increase is to raise less-educated immigrants' average hourly earnings by about 1.6% among both men and women.  The estimated coefficients for less-educated adult natives, in contrast, are both much smaller in magnitude (and sometimes negative) and statistically insignificant.  This result is not surprising given the distribution of earnings relative to the minimum wage among natives who do not have a high school diploma, as discussed above.

The estimated earnings effect is largest among teens.  Estimates that combine the sexes and control for business cycle effects, suggest an earnings elasticity of about 0.18.  This result appears to be driven by male teens; the estimated elasticity of average hourly earnings with respect to the minimum wage is considerably larger among male teens than among female teens when controlling for the business cycle (0.22 and 0.14, respectively).

As a specification check, we also estimated the earnings regression among workers who have at least a college degree.  These workers should not be affected by changes in the minimum wage, so a significant coefficient on the minimum wage variable in the earnings regression

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[9] The results are similar (although generally slightly larger in magnitude) when only workers paid hourly are included in the sample.

would suggest a problem with our specification.  As expected, we found no relationship between average hourly earnings and the minimum wage among college-educated workers.[10]

**Employment Effects**

The results do not indicate that higher minimum wages have adverse effects on employment rates among low-skilled adults.  As the top panel in Table 4 shows, employment among neither low-skilled adult immigrants nor adult natives is significantly negatively associated with the real minimum wage.  The estimated coefficients among low-skilled adult men are positive but, controlling for state-level economic conditions in column 4, statistically insignificant.  Given the absence of positive wage effects, it is not surprising that we do not find adverse employment effects among natives.  Table 3 does indicate positive wage effects among immigrants, but the results in Table 4 indicate that these wage increases do not cause significant employment losses.  As expected, including controls for general economic conditions to reduce endogeneity bias lowers the estimated coefficients on the minimum wage variable in all of the specifications.

The results do indicate adverse employment effects among teens, with a 10% increase in the minimum wage reducing teen employment by about 1.8% when controlling for state-level economic conditions.  This estimate is similar to results reported in previous studies that have found adverse effects among teens in analyses combining the sexes (e.g., Burkhauser, Couch, and Wittenburg, 2000; Neumark and Wascher, 1992, 1994).  The result is again driven by male teens, among whom a 10% increase in the minimum wage reduces employment by about 1.9%.  The results do not indicate a significant effect among female teens.  Our finding that the minimum wage has a more adverse employment effect among male teens than among female

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[10] The estimated coefficient in a regression pooling these highly-educated natives and immigrants was 0.017 (0.032).

teens is similar to results reported by Bernstein and Schmitt (1998) and Neumark and Wascher (2007).[11]

We find similar results when using the relative minimum wage to measure the level of the wage floor. As shown in the bottom panel of Table 4, the estimated coefficients of the relative minimum wage variable are fairly similar in magnitude and statistical significance to the estimated coefficients of the real minimum wage variable. As with the real minimum wage results, the adverse employment effects of higher relative minimum wages are concentrated among male teens in the specifications that control for the business cycle. In results not shown here, the estimated coefficients on the real average wage variable are typically negative and statistically significant. Keil at al. (2001) report a similar result from their relative minimum wage specification.

**Hours Effects**

Another possible effect of higher minimum wages is changes in hours worked. As discussed above, average hours could increase or decrease among the sample of workers while average hours worked are expected to decrease among the population as a whole in response to higher minimum wages. Previous research has reached mixed conclusions about the effect of minimum wage increases on average hours (Couch and Wittenberg, 2001; Neumark, Schweitzer, and Wascher, 2004; Zavodny, 2000).

The results suggest that, like employment, average hours worked do not fall among low-skilled immigrants when the real minimum wage increases.[12] As the top panel of Table 5 shows,

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[11] However, Pabilonia (2002) finds a more adverse effect among females than males when examining workers aged 14-16 using data from the National Longitudinal Survey of Youth 1997.
[12] For brevity, we only present hours results for the real minimum wage specifications. Results using the relative minimum wage are similar.

there was no statistically significant relationship between average hours and the minimum wage among low-skilled immigrants who worked. In addition, average hours among low-skilled immigrants as a whole, including nonworkers, are not significantly associated with the minimum wage, as shown in the bottom panel of the table. The results also do not indicate significant effects on average hours among low-skilled natives, which again is not surprising given the lack of earnings effects.

The results do indicate that changes in the real minimum wage lead to changes in average hours among employed teens. When the minimum wage increases, average hours tend to increase among male teens who work and to fall among female teens who work. The estimated responses to a 10% increase in the real minimum wage are a 0.9% increase in male teen workers' average hours (although only significant at $p=0.11$) and a 1.3% decrease in female teen workers' average hours. The latter result explains our failure to find adverse employment effects among female teens—their hours are cut instead. There is also a negative effect on average hours among female teens as a whole (panel B) while there is no significant negative effect among all male teens. However, our earlier results did indicate a negative overall employment effect among male teens.

**Robustness of Results**

Our results thus far suggest that teens experience adverse effects from higher minimum wages, either in the form of employment losses among males or hours cuts among females. We find no evidence of significant employment or hours reductions among low-skilled adult immigrants despite positive effects on hourly earnings. We find no effects on average earnings, employment, or hours among low-skilled adult natives. We examine the robustness of these

results to three variations on our main specification: using the unemployment rate to control for state-level economic conditions; controlling for the relative population size of the age/education/nativity group; and, among teens, controlling for the school enrollment rate.

The results are, in general, robust to these changes (see Appendix Table 2). The employment rate among low-skilled adult male natives is positively associated with the real minimum wage when the unemployment rate is included, and the employment rate among low-skilled adult male immigrants is positively associated with the real minimum wage when the relative population size is added to the specification that includes the unemployment rate. The negative employment effects among male teens become smaller in magnitude and significance when the unemployment rate and then the relative population size are included in the regression. We have chosen to focus on results that use other variables to control for the business cycle since the unemployment rate, unlike employment, lags economic activity. The negative hours result among female teen workers is sensitive to including the enrollment rate, but we note concerns that enrollment may be endogenous with respect to the minimum wage.

The full effect of changes in the minimum wage may not occur immediately but rather with a lag. To investigate this possibility, we include a one-year lag of the real minimum wage in the earnings, employment, and hours regressions. Neumark and Wascher (1992), Baker et al. (1999), and Burkhauser et al. (2000), among others, use a similar approach in state-level panel data. The results are not shown here because we do not find that the one-year lag of the real minimum wage is significantly negatively associated with employment rates or average hours, with one exception: employment among low-skilled adult immigrant women. The results for the sum of the estimated coefficients of the current and lag minimum wage variables are also not different from the current minimum wage results shown in the tables: higher minimum wages

lead to lower employment among male teens and lower hours among female teens but do not have a significant effect on low-skilled adult immigrants or natives.

The gender asymmetry in the teen results is striking. Female teens are more likely to earn near the minimum wage but experience smaller wage effects from minimum wage increases. Female teens appear to have experienced a cut in hours, while male teens appear to have lost jobs entirely when the minimum wage rises. Gender differences in industry and occupation, such as females being more likely to hold tipped jobs that usually were not directly affected by minimum wage hikes, are one potential reason for these asymmetries.

Another potential explanation is gender differences in enrollment behavior; young women are more likely than young men to be enrolled in school. Regressions of the log of the fraction of teens aged 16-19 enrolled in school (either full-time of part-time) on the log of the real minimum wage, the business cycle controls, and state and year fixed effects indicated that higher minimum wages reduce the fraction of female teens enrolled in school but have no significant effect among male teens.[13] Of course, this simple regression does not control for the fact that employment, hours, and enrollment are all jointly determined. Reasons for the gender difference in the effects of the minimum wage on enrollment and labor force outcomes are an interesting area for research but beyond our focus on immigrants here.

**Undocumented Immigrants and the Minimum Wage**

As discussed earlier, increases in the minimum wage might have no effect on undocumented immigrants if their employers do not obey minimum wage laws. Our estimated positive wage effects among immigrants may overstate the total effect on low-skilled immigrants if the CPS does not include undocumented immigrants and those workers are relatively

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[13] The estimated coefficient for females was -0.151 (0.057), and -0.060 (0.058) for males.

unaffected by minimum wage increases. Although previous studies indicate that the CPS does include undocumented immigrants (Bean et al., 1998; Hanson, 2006), this group is likely underrepresented in the surveys. Estimates suggest that in the late 1990s, the CPS probably missed between one-quarter and one-third of illegal immigrants (Passel and Fix 2001). Post-2000, the undercount is generally believed to be much improved, with the CPS covering about the same share of the illegal immigrant population—about 90 percent—as the 2000 Census (Passel, Van Hook, and Bean 2004).

In order to examine the effect of the minimum wage on undocumented immigrants, we estimated the labor force outcomes regressions separately for low-education immigrants from Latin America and from Asia. Latin American countries accounted for at least 80 percent of undocumented immigrants present in the U.S. in 2000 (INS 2003; Passel, Capps, and Fix 2004), so the fraction of low-education immigrants who are undocumented is likely to be higher among Latin Americans than among Asians. Interestingly, we found a significant positive relationship between the minimum wage and hourly earnings among Latin Americans but not among Asians. Much as with our results above, we did not find evidence of significant negative effects on employment or hours for immigrants from either region.

**Mobility and the Minimum Wage**

Our failure to find adverse employment or hours effects of higher minimum wages on low-skilled adult immigrants is at odds with the conventional competitive labor market model. If minimum wages raise average earnings among workers, the competitive model predicts that the equilibrium quantity of labor hired should fall. Yet we do not find evidence that this occurs. One potential explanation of our results within the framework of a competitive labor market

model is that low-skilled immigrants' locational choices may be influenced by the minimum wage. Low-skilled immigrants who have little safety net, particularly the undocumented, may move to another state or even return home if they lose their jobs when the minimum wage increases. Indeed, recent work by Bean et al (2007) suggests that undocumented immigrants were more likely than low-education natives or legal immigrants to move between states during 1995-2000.[14] Also, newly-arriving low-skilled immigrants may be less likely to settle in states with higher minimum wages if their employment prospects are worse in such states. Such endogenous locational choice would explain our finding of positive wage effects yet no disemployment impact from higher minimum wages.

To address this issue, we examine whether higher minimum wages are related to the skill composition of the population within a state and to the distribution of low-skilled workers across states. If a higher minimum wage in a state causes low-skilled immigrants who lose their jobs to leave that state (either to move to another state or to leave the U.S.) or discourages other low-skilled immigrants from moving to that state, we should observe that the fraction of a state's population that is composed of low-skilled immigrants is negatively associated with the level of the real minimum wage. Further, the average education level among immigrants should be positively associated with the real minimum wage within a state, and the fraction of immigrants without a high school diploma should be negatively associated with the real minimum wage. We should also observe that low-skilled immigrants are more likely to live in states with lower minimum wages.

We examine these hypotheses using state-level panel data models similar to those estimated above. Instead of labor market outcomes, the left-hand-side variable is low-skilled

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[14] Neuman and Tienda (1994) also found a negative relationship between legal status at entry and internal migration among immigrants who applied for legalization through the 1986 amnesty.

immigrants (or natives) aged 20-54 as a fraction of the state population aged 16-64; average years of education among adult immigrants (or natives) living in a state; the fraction of adult immigrants (or natives) within a state who do not have a high school diploma or equivalent; or the fraction of low-skilled adult immigrants (or natives) who live in a given state.[15] All of these variables are derived from the CPS ORG data for 1994-2005 and are annual, state-level averages. The right-hand-side variables are the natural log of the real minimum wage, the business cycle controls, and state and year fixed effects. The standard errors are clustered on the state. To avoid giving undue influence to larger states, particularly California, we do not weight the state-year observations in these regressions.[16]

The results suggest that minimum wages influence low-skilled immigrants' location patterns. As shown in Table 6, there is a statistically significant negative relationship between the real minimum wage and the fraction of the state population composed of low-skilled adult immigrants (panel A). The fraction comprised of low-skilled adult natives, in contrast, is positively associated with the minimum wage; this result is consistent with low-skilled natives moving away from states with more low-skilled immigrants (Borjas, 2006) or with state legislatures raising the minimum wage when the share of less-educated, low-wage native-born voters increases.

Further, average number of years of education among adult immigrants is positively associated with the minimum wage (panel B). This suggests that raising the minimum wage causes less-educated immigrants to leave (or not move to) a state or attracts relatively well-educated immigrants. We do not find the same pattern for adult natives. In addition, the fraction

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[15] The last variable is the distribution of low-skilled individuals across states each year. In cases where the CPS reports education in categories (e.g., grades 1-4), we imputed years of schooling as the median number of years within the category.

[16] Dropping California does not materially change the results, but coefficients are smaller in magnitude when the observations are weighted using state populations.

of adult immigrants lacking a high school diploma is negatively associated with the real minimum wage; the opposite pattern held for female adult natives (panel C). The distribution of low-skilled immigrants across states also appears to be inversely related to effective minimum wages while the distribution of low-skilled natives is not related to the minimum wage (panel D)

Migration-induced changes in population composition could explain why higher minimum wages boosted average wages among low-skilled immigrants without creating adverse employment or hours effects. Higher minimum wages might have encouraged low-skilled immigrants to leave one state and move to another or to leave the U.S. For low-skilled immigrants remaining in the origin state, the smaller number of competing workers may mitigate any adverse employment effects that minimum wage increases would otherwise cause. As noted by Ottaviano and Peri (2005), among others, recent immigrants tend to be more substitutable for other immigrants than for natives, so a reduction in the number of low-skilled immigrants in a state (or a reduction in their growth rate) would be expected to have a greater effect on immigrants' labor market outcomes than on natives' outcomes.

We also used data from the March CPS to examine whether minimum wages affect the average education level of individuals who move across states. The March CPS asks individuals their place of residence one year ago.[17] Based on these responses, we created a sample of individuals aged 20-54 who moved across states. We regressed the average numbers of years of education among out-movers from a given state on that state's minimum wage, the business cycle controls, and state and year fixed effects, or

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[17] We used data from the 1994-2005 March CPS except for 1995, when the survey asked about place of residence 5 years ago. We only included individuals who moved across states and who were in households in their first 4 months-in-sample in the CPS. Because the sample is small (since it only includes individuals who moved across states), we did not estimate the regression separately for men and women.

$$\text{Educ}_{st} = \alpha + \beta \ln \text{MW}_{st} + \gamma \text{BusCycle}_{st} + \sigma S_s + \tau T_t + \varepsilon_{st}. \tag{4}$$

As in the earlier mobility regressions, to keep large states from driving the results, we do not weight the state-year observations.

The results indicate that a higher minimum wage in a state is associated with a significantly lower average education level among immigrants leaving that state but not among natives who do so; the estimated coefficient on the minimum wage variable is -5.187 (2.592) for immigrants and -1.061 (1.219) for natives. We caution that this sample includes only individuals who moved across states within the U.S., not those who left the U.S., and therefore may not capture the true effect of higher minimum wages on mobility. However, the results are consistent with the population composition results shown in Table 6 and suggest that minimum wages likely affect locational choices among low-skilled immigrants.

Immigrants and natives may not move directly in response to state or federal changes in minimum wages, but firms in low-wage industries may be more likely to open or expand establishments in states with lower effective minimum wages. Immigrants responding to firms' locational choices, and natives reacting to immigrants' locational choices (Borjas, 2006), could also underlie the patterns we observe in the population composition and in the distribution of low-skilled immigrants across states. Another possibility for our results, however, is that employers who have large numbers of low-skilled immigrant workers exert political pressure to prevent state minimum wage increases. Such reverse causality could also underlie the negative relationship between minimum wages and the presence of large numbers of less-educated immigrants.

**Conclusion**

The standard model of competitive labor markets predicts that minimum wages raise earnings and reduce employment probabilities for workers who are at the bottom of the wage distribution. Along with teens and young adults, the foreign-born account for a large share of low-wage workers in the U.S., and the size of the foreign-born workforce has been rising in recent years. Immigrant workers may be particularly affected by minimum wage increases given their relatively low levels of human capital, such as less formal education, limited English proficiency, and lack of institutional knowledge.

The results of our analyses of state-level data indicate that higher minimum wages boosted average hourly earnings among adult immigrants who did not have a high school diploma or equivalent education. However, we do not find evidence of adverse employment or hours effects among this group. We do find evidence of a decline in work among teens, with a difference by gender in whether employment or hours changed in response to higher minimum wages.

Our failure to find an adverse employment effect among low-skilled adult immigrants despite a positive wage effect could result from employers substituting those workers for teens when the minimum wage increases. In addition, immigrants' locational choices could respond to changes in minimum wages. We find some evidence that this may occur, as the educational composition of immigrants within states and the distribution of low-skilled immigrants across states are related to minimum wage levels.

The period we examine, 1994-2005, marks an era when immigrants began settling in large numbers in new parts of the U.S. in addition to going to traditional gateways like California, New York, and Texas. As the U.S. in the 1990s experienced the largest inflow of

foreign-born people ever in its history, North Carolina and Georgia were the states that experienced the greatest percentage gains in foreign-born population.[18] Notably, these two states did not increase their minimum wage beyond the federal level during that period. If firms that hire low-wage immigrants increased employment more in states with lower effective minimum wages, immigrants likely responded by moving to those states. The effect of minimum wages on locational choices among firms that hire immigrants versus natives is a promising subject for future research.

The large increase in the federal minimum wage that is set to occur in 2008 and 2009 will provide an opportunity for economists to examine the effects of a sizable increase in minimum wages across most of the country. The two-step increase in the federal minimum wage to $7.25 per hour from $5.85 exceeds the state minimum wages as of January 2007 in all states except California, Connecticut, Hawaii, Massachusetts, Oregon, Rhode Island, Vermont, and Washington. By creating a relatively high national wage floor, the proposed increase would reduce firms' opportunity to move to areas with low state minimum wages or expand operations in those areas, possibly leading to larger disemployment effects among immigrants than those found in this study.

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[18] See http://www.census.gov/prod/2003pubs/c2kbr-34.pdf

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**Figure 1. Cumulative Distribution of Hourly Earnings Relative to Minimum Wage**
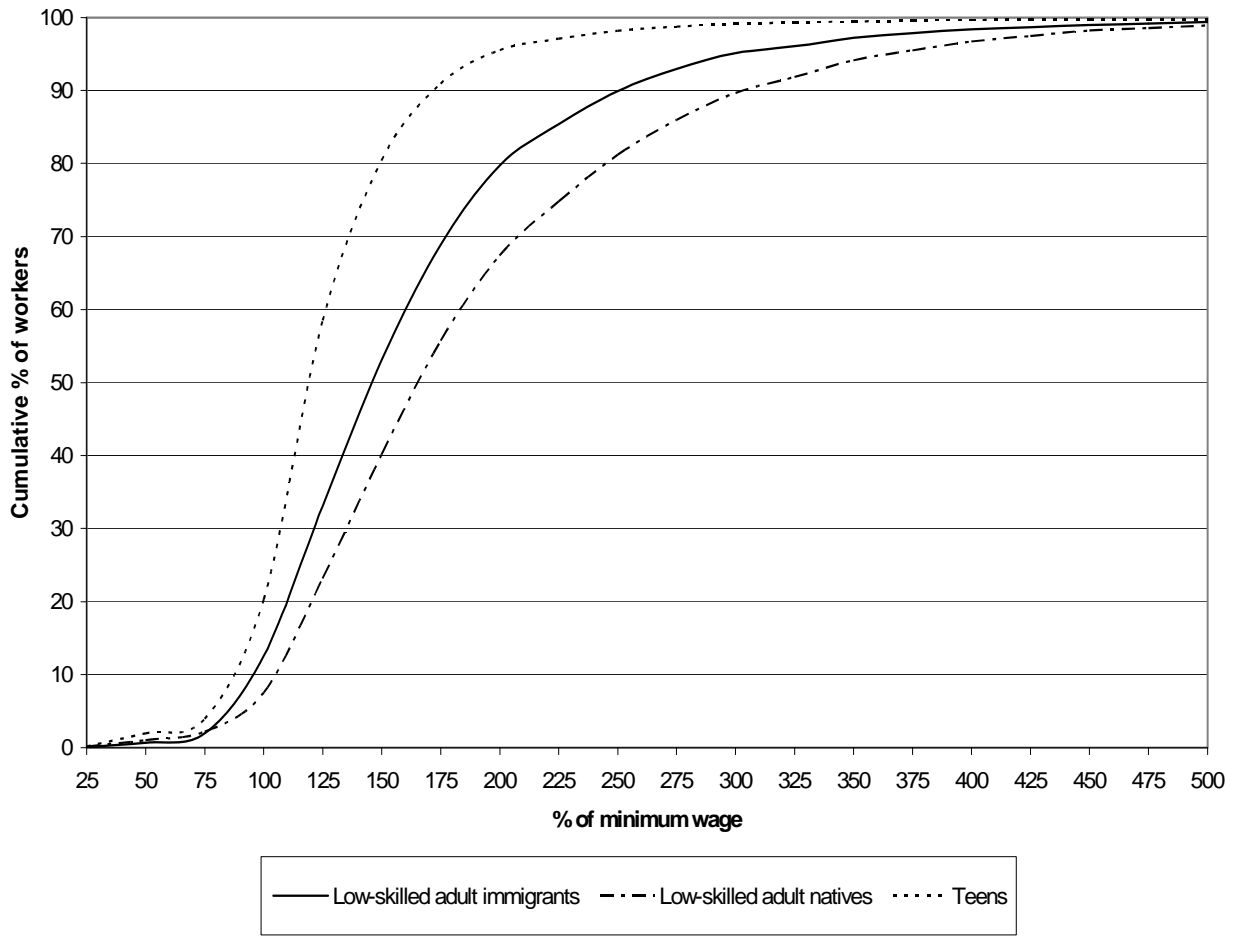
**Table 1**
**Share of Workers Earning Exactly or Near the Minimum Wage**
**and Employment Rates, by Demographic Group**

|  | Exactly MW | Below MW | Within 125% of MW | Employment Rate |
|---|---|---|---|---|
| All workers | 0.014 | 0.033 | 0.085 | 0.633 |
| Immigrants | 0.025 | 0.048 | 0.121 | 0.626 |
| Natives | 0.013 | 0.030 | 0.080 | 0.634 |
|  |  |  |  |  |
| Not high school graduate (aged 20-54) | 0.035 | 0.062 | 0.177 | 0.614 |
| Immigrants | 0.050 | 0.076 | 0.206 | 0.679 |
| Males | 0.039 | 0.057 | 0.173 | 0.857 |
| Females | 0.071 | 0.115 | 0.278 | 0.467 |
| Natives | 0.024 | 0.052 | 0.156 | 0.576 |
| Males | 0.013 | 0.033 | 0.103 | 0.676 |
| Females | 0.039 | 0.078 | 0.233 | 0.468 |
|  |  |  |  |  |
| Teens (aged 16-19) | 0.086 | 0.117 | 0.382 | 0.416 |
| Males | 0.081 | 0.097 | 0.363 | 0.413 |
| Females | 0.092 | 0.136 | 0.402 | 0.419 |

Note: Shown are the fractions of workers in the indicated age/education group earning exactly the minimum wage, less than the minimum wage, and more than the minimum wage but within 125% above the minimum wage, and the employment-to-population rate. Calculations are based on data from the CPS-ORG during the period 1994-2005, weighted using the outgoing rotation weights. Columns 1-3 only include individuals who earn between $1 and $100 per hour.

**Table 2**
**Characteristics of Low-Wage Workers**

| | Workers Earning: | | | |
| --- | --- | --- | --- | --- |
| | Exactly MW | Below MW | Within 125% of MW | All Workers |
| Average age | 29.3 | 33.5 | 31.8 | 38.5 |
| | (14.3) | (15.4) | (14.7) | (12.8) |
| Teen (aged 16-19) | 0.330 | 0.196 | 0.246 | 0.066 |
| | (0.470) | (0.397) | (0.431) | (0.228) |
| Young adult (aged 20-24) | 0.212 | 0.206 | 0.209 | 0.108 |
| | (0.409) | (0.404) | (0.407) | (0.311) |
| Foreign born | 0.225 | 0.185 | 0.180 | 0.127 |
| | (0.418) | (0.389) | (0.385) | (0.333) |
| Female | 0.588 | 0.616 | 0.588 | 0.482 |
| | (0.492) | (0.486) | (0.492) | (0.500) |
| Less than high school graduate | 0.461 | 0.319 | 0.359 | 0.128 |
| | (0.498) | (0.466) | (0.480) | (0.334) |
| High school graduate, no college | 0.278 | 0.304 | 0.328 | 0.316 |
| | (0.448) | (0.460) | (0.469) | (0.465) |
| Some college, not college graduate | 0.230 | 0.276 | 0.255 | 0.292 |
| | (0.421) | (0.447) | (0.436) | (0.455) |
| Sample size | 26,407 | 63,427 | 162,616 | 1,948,815 |

Note: Shown are means (standard deviations) based on individual-level data from the CPS-ORG during the period 1994-2005 for workers who earn between $1 and $100 per hour.

**Table 3**
**Effect of the Minimum Wage on Average Hourly Earnings**

|  | Both sexes | | Males | | Females | |
|---|---|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| Less-educated immigrants | 0.220*** | 0.150** | 0.219*** | 0.162** | 0.244*** | 0.158* |
|  | (0.062) | (0.071) | (0.055) | (0.068) | (0.091) | (0.090) |
| Less-educated natives | 0.031 | -0.022 | 0.065 | -0.024 | -0.067 | -0.043 |
|  | (0.082) | (0.080) | (0.091) | (0.073) | (0.075) | (0.106) |
| All teens | 0.214*** | 0.184*** | 0.223*** | 0.221*** | 0.203*** | 0.140** |
|  | (0.026) | (0.035) | (0.038) | (0.043) | (0.047) | (0.054) |
| Business cycle controls | No | Yes | No | Yes | No | Yes |

* $p<.1$; ** $p<.05$; *** $p<.01$
Note: Shown are estimated coefficients on the natural log of the real minimum wage from OLS regressions. The dependent variable is the natural log of the average real hourly earnings for workers in the indicated group. Each coefficient is from a separate regression. All regressions include state and year fixed effects; some specifications add business cycle controls (the natural log of real gross state product per capita, the real contract value of residential building permits, and the number of initial unemployment claims). Less-educated adults are aged 20-54 and do not have a high school diploma; teens are aged 16-19. The number of observations in each regression is a maximum of 612, representing the 50 states and DC during the period 1994-2005. Robust, clustered standard errors are in parentheses. Observations are weighted using the sum of the outgoing rotation weights for each cell.

**Table 4**
**Effect of the Minimum Wage on Employment Rates**

|  | Both sexes | | Males | | Females | |
|---|---|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| A. Real minimum wage | | | | | | |
| Less-educated immigrants | 0.026 | -0.060 | 0.073** | 0.025 | 0.029 | -0.100 |
|  | (0.048) | (0.053) | (0.036) | (0.045) | (0.097) | (0.122) |
| Less-educated natives | 0.231 | 0.093 | 0.195* | 0.058 | 0.231 | 0.114 |
|  | (0.140) | (0.088) | (0.116) | (0.067) | (0.143) | (0.138) |
| All teens | -0.001 | -0.181* | 0.003 | -0.194** | -0.004 | -0.163 |
|  | (0.124) | (0.094) | (0.125) | (0.094) | (0.133) | (0.116) |
| B. Relative minimum wage | | | | | | |
| Less-educated immigrants | 0.075 | -0.028 | 0.100*** | 0.065 | 0.049 | -0.175 |
|  | (0.047) | (0.078) | (0.035) | (0.060) | (0.086) | (0.157) |
| Less-educated natives | 0.202 | 0.011 | 0.181 | -0.007 | 0.139 | -0.001 |
|  | (0.181) | (0.118) | (0.150) | (0.077) | (0.198) | (0.192) |
| All teens | 0.023 | -0.165* | 0.006 | -0.214*** | 0.046 | -0.107 |
|  | (0.127) | (0.092) | (0.115) | (0.073) | (0.145) | (0.129) |
| Business cycle controls | No | Yes | No | Yes | No | Yes |

* p<.1; ** p<.05; *** p<.01
Note: Shown are estimated coefficients on the natural log of the real minimum wage or the natural log of the relative minimum wage (the minimum wage divided by the average wage) from OLS regressions. The dependent variable is the natural log of the employment-to-population rate for each group. Each coefficient is from a separate regression. All regressions include state and year fixed effects; some specifications add business cycle controls (the natural log of real gross state product per capita, the real contract value of residential building permits, and the number of initial unemployment claims). Regressions in panel B also include the natural log of the real average wage. Less-educated adults are aged 20-54 and do not have a high school diploma; teens are aged 16-19. The number of observations in each regression is a maximum of 612, representing the 50 states and DC during the period 1994-2005. Robust, clustered standard errors are in parentheses. Observations are weighted using the sum of the final weights for each cell.

**Table 5**
**Effect of the Minimum Wage on Average Hours Worked**

| | Both sexes | | Males | | Females | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| A. Employed individuals | | | | | | |
| Less-educated immigrants | 0.001 | -0.006 | 0.027 | 0.008 | -0.057 | -0.033 |
| | (0.020) | (0.024) | (0.023) | (0.032) | (0.035) | (0.044) |
| | | | | | | |
| Less-educated natives | 0.014 | -0.012 | 0.019 | -0.004 | -0.007 | -0.029 |
| | (0.029) | (0.027) | (0.021) | (0.021) | (0.048) | (0.063) |
| | | | | | | |
| All teens | 0.072 | -0.009 | 0.184*** | 0.092 | -0.065 | -0.129*** |
| | (0.059) | (0.043) | (0.069) | (0.074) | (0.061) | (0.043) |
| | | | | | | |
| B. All individuals | | | | | | |
| Less-educated immigrants | -0.002 | -0.111 | 0.091 | 0.018 | -0.072 | -0.202 |
| | (0.071) | (0.076) | (0.056) | (0.071) | (0.109) | (0.139) |
| | | | | | | |
| Less-educated natives | 0.237 | 0.079 | 0.205 | 0.052 | 0.232 | 0.090 |
| | (0.179) | (0.122) | (0.141) | (0.088) | (0.198) | (0.209) |
| | | | | | | |
| All teens | 0.028 | -0.232* | 0.130 | -0.164 | -0.101 | -0.313** |
| | (0.169) | (0.120) | (0.180) | (0.159) | (0.174) | (0.119) |
| | | | | | | |
| Business cycle controls | No | Yes | No | Yes | No | Yes |

* p<.1; ** p<.05; *** p<.01

Note: Shown are estimated coefficients on the natural log of the real minimum wage from OLS regressions. The dependent variable is the natural log of average usual weekly hours worked among employed individuals (panel A) or all individuals (panel B) for each group. Each coefficient is from a separate regression. All regressions include state and year fixed effects; some specifications add business cycle controls (the natural log of real gross state product per capita, the real contract value of residential building permits, and the number of initial unemployment claims). Less-educated adults are aged 20-54 and do not have a high school diploma; teens are aged 16-19. The number of observations in each regression is a maximum of 612, representing the 50 states and DC during the period 1994-2005. Robust, clustered standard errors are in parentheses. Observations are weighted using the sum of the final weights for each cell.

**Table 6**
**Compositional Effects of the Minimum Wage**

|  | Both sexes | Males | Females |
|---|---|---|---|
| A. Fraction of state population aged 16-64 composed of: | | | |
| Less-educated adult immigrants | -0.015** | -0.009** | -0.005* |
|  | (0.007) | (0.004) | (0.003) |
|  | | | |
| Less-educated adult natives | 0.014* | 0.004 | 0.011** |
|  | (0.008) | (0.005) | (0.004) |
|  | | | |
| B. Average years of education among: | | | |
| Adult immigrants | 2.145*** | 2.089** | 2.164*** |
|  | (0.762) | (0.935) | (0.648) |
|  | | | |
| Adult natives | -0.113 | -0.162 | -0.066 |
|  | (0.102) | (0.114) | (0.105) |
|  | | | |
| C. Fraction that does not have a high school diploma among: | | | |
| Adult immigrants | -0.195** | -0.192** | -0.176** |
|  | (0.075) | (0.089) | (0.068) |
|  | | | |
| Adult natives | 0.020* | 0.013 | 0.028** |
|  | (0.010) | (0.012) | (0.011) |
|  | | | |
| D. Fraction of individuals without a high school diploma living in a state: | | | |
| Adult immigrants | -0.032* | -0.036* | -0.026* |
|  | (0.017) | (0.019) | (0.014) |
|  | | | |
| Adult natives | 0.002 | 0.003 | -0.002 |
|  | (0.001) | (0.003) | (0.003) |

\* p<.1; \*\* p<.05; \*\*\* p<.01
Note: Shown are estimated coefficients on the natural log of the real minimum wage from OLS regressions. In panel A, the dependent variable is the fraction of the state population aged 16-64 that is immigrants (or natives) aged 20-54 who do not have a high school diploma. In panels B and C, the sample is restricted to immigrants or natives aged 20-54; in panel D, the sample is further restricted to individuals who do not have a high school diploma. Each coefficient is from a separate regression. All regressions include state and year fixed effects and business cycle controls (the natural log of real gross state product per capita, the real contract value of residential building permits, and the number of initial unemployment claims). The number of observations in each regression is a maximum of 612, representing the 50 states and DC during the period 1994-2005. Robust, clustered standard errors are in parentheses.

**Appendix Table 1**
**States that Exceeded the Federal Minimum Wage**

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alaska | X | X | X | X | X | X | X | X | X | X | X | X |
| California | | | | X | X | X | X | X | X | X | X | X |
| Connecticut | X | X | X | X | X | X | X | X | X | X | X | X |
| Delaware | | | X | X | | X | X | X | X | X | X | X |
| D.C. | X | X | X | X | X | X | X | X | X | X | X | X |
| Hawaii | X | X | X | X | X | X | X | X | X | X | X | X |
| Illinois | | | | | | | | | | | X | X |
| Iowa | X | X | X | | | | | | | | | |
| Maine | | | | | | | | | X | X | X | X |
| Massachusetts | | | X | X | X | X | X | X | X | X | X | X |
| Minnesota | | | | | | | | | | | | X |
| New Jersey | X | X | X | X | | | | | | | | |
| New York | | | | | | | | | | | | X |
| Oregon | X | X | X | X | X | X | X | X | X | X | X | X |
| Rhode Island | X | X | X | X | | X | X | X | X | X | X | X |
| Vermont | | X | X | X | X | X | X | X | X | X | X | X |
| Washington | X | X | X | X | X | X | X | X | X | X | X | X |
| Wisconsin | | | | | | | | | | | | X |

Note: The federal minimum wage rose from $4.25 an hour to $4.75 an hour in October 1996 and to $5.15 an hour in September 1997.  Shown are states that exceeded the federal minimum wage at any time during the year(s) indicated.

**Appendix Table 2**
**Robustness Checks**

| | Hourly Earnings | | | Employment-to-Population | | | Hours among Workers | | |
|---|---|---|---|---|---|---|---|---|---|
| | Both | Males | Females | Both | Males | Females | Both | Males | Females |
| **A. Use unemployment rate to control for business cycle** | | | | | | | | | |
| Less-educated immigrants | 0.208*** | 0.210*** | 0.212** | -0.021 | 0.039 | -0.054 | -0.005 | 0.016 | -0.051 |
| | (0.065) | (0.055) | (0.096) | (0.042) | (0.041) | (0.127) | (0.023) | (0.024) | (0.046) |
| Less-educated natives | 0.017 | 0.047 | -0.070 | 0.139 | 0.108* | 0.137 | -0.006 | 0.004 | -0.033 |
| | (0.087) | (0.091) | (0.086) | (0.083) | (0.063) | (0.113) | (0.027) | (0.020) | (0.054) |
| All teens | 0.212*** | 0.217*** | 0.203*** | -0.103 | -0.097 | -0.109 | 0.032 | 0.142*** | -0.104** |
| | (0.031) | (0.042) | (0.052) | (0.072) | (0.077) | (0.091) | (0.036) | (0.051) | (0.047) |
| **B. Add control for fraction of population aged 16-64** | | | | | | | | | |
| Less-educated immigrants | 0.228*** | 0.208*** | 0.275** | 0.017 | 0.077** | -0.067 | -0.014 | 0.004 | -0.063 |
| | (0.071) | (0.057) | (0.105) | (0.053) | (0.038) | (0.146) | (0.023) | (0.024) | (0.051) |
| Less-educated natives | 0.034 | 0.070 | -0.063 | 0.089 | 0.099 | 0.096 | -0.001 | 0.006 | -0.030 |
| | (0.094) | (0.098) | (0.094) | (0.081) | (0.062) | (0.112) | (0.028) | (0.020) | (0.055) |
| All teens | 0.206*** | 0.219*** | 0.199*** | -0.115 | -0.120 | -0.119 | 0.028 | 0.130** | -0.102** |
| | (0.033) | (0.043) | (0.053) | (0.078) | (0.085) | (0.093) | (0.038) | (0.051) | (0.047) |
| **C. Add enrollment rate** | | | | | | | | | |
| All teens | 0.200*** | 0.210*** | 0.209*** | -0.128 | -0.186** | -0.099 | 0.012 | 0.062 | -0.064 |
| | (0.036) | (0.043) | (0.056) | (0.082) | (0.089) | (0.102) | (0.037) | (0.042) | (0.056) |

\* p<.1; ** p<.05; *** p<.01

Note: Shown are estimated coefficients on the natural log of the real minimum wage from OLS regressions. The dependent variable is the natural log of real average hourly earnings, the natural log of the employment-to-population rate, or the natural log of average usual weekly hours worked among employed individuals in the indicated group. Each coefficient is from a separate regression. All regressions include state and year fixed effects. Less-educated adults are aged 20-54 and do not have a high school diploma; teens are aged 16-19. Robust, clustered standard errors are in parentheses. The number of observations in each regression is a maximum of 612, representing the 50 states and DC during the period 1994-2005. Observations are weighted using the sum of the outgoing rotation (earnings) or final (employment and hours) weights for each cell.