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# IMMIGRATION AND WAGES

## Methodological advancements confirm modest gains for native workers

BY HEIDI SHIERHOLZ

## Executive summary

In the ongoing debate on immigration, there is broad agreement among academic economists that it has a small but positive impact on the wages of native-born workers *overall*: although new immigrant workers add to the labor supply, they also consume goods and services, which creates more jobs.

The real debate among researchers is whether a large influx of a *specific type* of worker (say, workers with a particular level of education or training) has the potential to have a negative impact on the wages of existing workers of that *same type*. Some research argues that immigrant competition is quite costly to certain groups of native-born U.S. workers, while other research finds that native workers—even those who have levels of education and experience similar to new immigrants—may actually reap modest benefits from immigration.

We begin this paper with a review of the scholarly literature on immigration's effect on wages, focusing on recent methodological advancements. We then use Current Population Survey (CPS) data from 1994 to 2007 to conduct our own empirical analysis of immigration's effect on wages over this period, incorporating these recent methodological advancements. Our analysis finds little evidence that immigration negatively impacts native-born workers.

*A key result from this work is that the estimated effect of immigration from 1994 to 2007 was to raise the wages of U.S.-born workers, relative to foreign-born workers, by 0.4% (or $3.68 per week), and to lower the wages of foreign-born workers, relative to U.S.-born workers, by 4.6% (or*

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*$33.11 per week).* In other words, any negative effects of new immigration over this period were felt largely by the workers who are the most substitutable for new immigrants—that is, earlier immigrants.

Additional key results from this analysis:

- For workers with less than a high school education, the relative wage effect of immigration was similar to the overall effect. U.S.-born workers with less than a high school education saw a relative 0.3% increase in wages (or $1.58 per week), while foreign-born workers with less than a high school education saw a relative 3.7% decrease in wages (or $15.71 per week). *In other words, immigration among workers with less than a high school degree served to lower the relative wages of other immigrant workers with less than a high school degree, not native workers with less than a high school degree.*
- The wages of male U.S.-born workers with less than a high school education were largely unaffected by immigration over this period, experiencing a relative decline of 0.2% due to immigration (or $1.37 per week). Female U.S.-born workers with less than a high school education experienced a relative increase in wages of 1.1% due to immigration ($4.19 per week).
- Around 3% of the increase from 1994 to 2007 in wage inequality between workers with less than a high school degree and workers with a college degree or more can be attributed to immigration.
- This analysis finds no evidence that young workers in particular are adversely affected by immigration.
- While the methodology used in this paper does not allow for a racial breakdown of the effect of immigration on U.S.-born workers in different education groups, we find that the overall effect of immigration on wages is similar for white non-Hispanic U.S.-born workers (+0.5%) and black non-Hispanic U.S.-born workers (+0.4%) .
- From 1994 to 2007, the effect of immigration on wages did not vary greatly over periods of very different labor demand, in part, because immigration flows respond strongly to the conditions of the U.S. economy.
- An analysis of the four states with the highest immigration over this period—California, Florida, New York, and Texas—revealed some interesting departures from the national average. In these states, like at the national level, the overall relative effect of immigration was positive on native workers. However, some subgroups in these states fared worse—particularly male workers with less than a high school degree.

## Introduction

In the ongoing debate over immigration policy in the United States, the impact of immigrants on the wages of native-born workers has been a central point of disagreement. There is broad agreement among academic economists on one point: that immigration has a small but positive impact on the wages of native-born workers overall. Although new immigrant workers add to the labor supply, they also consume goods and services, creating more jobs. In other words, as the labor force expands (as it is always doing, due to both native population growth and immigration), the economy adjusts and expands with it, and *average* wages are not hurt.

The actual heart of the debate is whether a large influx of a specific type of worker (say, workers with a particular level of education or training) has the potential to have a negative impact on the wages of existing workers of that type. Some parties in the debate argue that immigrant competition is quite costly to some native-born U.S. workers, particularly workers with low levels of education, among whom immigrant inflows have been relatively high. Others argue that a simple supply/demand framework may lead to that conclusion, the real world is more complicated. In fact, native workers who have similar levels of education and experience to new immigrants may even reap modest benefits from immigration.

This more-nuanced research has gained sway in recent years. It argues that it is not simply the increased supply of one group of workers that determines outcomes for another group. Were that so, then there would be little to argue about: a disproportionate increase in the supply of foreign-born workers of a certain type would lower


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the wages of native-born workers who are also of that type. Instead, the characteristics of the added workers, and the specific role they play in the economy, make a big difference.

In the language of economics, it matters a great deal whether immigrant workers are *substitutes for* or *complements to* native-born workers. The terms refer to how employers use workers in the production of their goods and services. If native workers are indistinguishable in this process from immigrants—if they are substitutes—it follows that a large influx of immigrant labor may hurt natives' earnings prospects. But if natives and immigrants fulfill different roles in the production process, then they may play complementary roles, and it is less likely that the supply shock in one group will hurt the other group, and it may in fact help them.

The economic literature, as described below, finds evidence to support both of these scenarios, and is thus somewhat ambiguous. This analysis, which uses Current Population Survey (CPS) data from 1994 to 2007 and incorporates recent advancements in the methodology used to estimate the effect of immigration on relative wages, finds little evidence of negative impacts on subgroups of workers.

Note that we are only able to look at the effect on native wages of increases in *foreign-born* workers. Foreign-born workers may be naturalized U.S. citizens, permanent residents, temporary visa-holders, refugees, or undocumented workers. While naturalized U.S. citizens are identified in the CPS, if a foreign-born worker is not a citizen, it is impossible to determine whether he or she is a permanent resident, temporary visa-holder, refugee, or undocumented worker. This unfortunately limits the policy relevance of the research presented here, since we are unable to determine the effect of various subgroups of foreign-born workers on native labor market outcomes. We cannot, for example, answer the question of whether the H1B temporary visa program is suppressing the wages of high tech workers, or whether undocumented farm workers are suppressing wages in agriculture. What we estimate is the effect of increases in the foreign-born labor supply on the relative wages of native-born workers overall and by education level, gender, and age. In this analysis, we find little evidence of large negative impacts, though we acknowledge that this may be masking very different outcomes in certain localities, industries, and occupations.

The methodology used in this analysis is explained in detail below. Note that we do not estimate the absolute effect of immigration on wages—instead, throughout this paper, we estimate the effect of immigration on the wages of subgroups of workers relative to other subgroups. A key result from this work is that the estimated effect of immigration from 1994 to 2007 was to raise the wages of U.S.-born workers, relative to foreign-born workers, by 0.4% (or $3.68 per week), and to lower the wages of foreign-born workers, relative to U.S.-born workers, by 4.6% (or $33.11 per week). *In other words, any negative effects of new immigration over this period were felt largely by those workers who are the most substitutable for new immigrants—earlier immigrants.*

Additional key results from this analysis:

- For workers with less than a high school education, the relative wage effect was similar to the overall effect. U.S.-born workers with less than a high school education saw a relative 0.3% increase in wages, which translates into an increase in weekly wages of $1.58 for this group, while foreign-born workers with less than a high school education saw a relative 3.7% decrease in wages, or $15.71 per week. *In other words, the surge in immigration among workers with less than a high school degree served to lower the relative wages of other immigrant workers with less than a high school degree, but not native workers with less than a high school degree.* This story is retold in each education category—U.S.-born workers see small positive relative wage effects and foreign-born workers see sizeable negative relative wage effects.
- The wages of male U.S.-born workers with less than a high school education were largely unaffected by immigration over this period, experiencing a relative decline of 0.2% due to immigration, or $1.37 per week. Female U.S.-born workers with less than a high school education experienced a relative increase in wages of 1.1% due to immigration, or $4.19 per week.


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- Around 3% of the increase from 1994 to 2007 in wage inequality between workers with less than a high school degree and workers with a college degree or more can be attributed to immigration.
- This analysis finds no evidence that young workers in particular are adversely affected by immigration.
- While the methodology used in this paper does not allow for a racial breakdown of the effect of immigration on U.S.-born workers in different education groups, we find that the overall effect of immigration on wages is similar for white non-Hispanic U.S.-born workers (+0.5%) and black non-Hispanic U.S.-born workers (+0.4%).
- Immigration flows respond to the conditions of the U.S. economy. From 1994 to 2000, when labor demand was very high and job growth averaged 2.5% per year, 941,000 immigrant workers entered the United States annually. From 2000 to 2003, when labor demand was weak and employment declined 0.5% per year, immigration flows plummeted to 342,000 new immigrants per year. From 1994-2000, a period of high labor demand and high immigration, immigration increased the relative wages of U.S.-born workers without a high school degree by 0.02% annually. From 2000-03, a period of low labor demand and low immigration, immigration decreased the relative wages of U.S.-born workers without a high school degree by 0.04% annually. The fact that the relative effect of immigration on wages does not vary greatly over periods of dramatically different labor demand offers some limited evidence that the immigrant-flow response to labor demand in the United States helps to smooth the effects of immigration on native wages across periods of strength and weakness in the U.S. labor market.
- An analysis of the four states with the highest immigration over this period—California, Florida, New York, and Texas—revealed some interesting departures from the national average. In these states, the overall relative effect of immigration was positive on native workers, around 0.7%, which was higher than the overall effect on native workers nationally, which was 0.4%. However, some subgroups in these high immigrant states fared worse—particularly male workers with less than a high school degree. Research by Jeffrey Passel and D'Vera Cohn at the Pew Research Center (Passel et al. 2009) could perhaps shed some light on this finding. In particular, their work shows that unauthorized immigrants make up a particularly large portion of the workforce in these four states relative to other states. Since, as shown in their work, unauthorized immigrants are more likely than other workers to be male and also more likely than other workers to be without a high school degree, a larger inflow of unauthorized immigrant workers, who are easily exploited by employers, may put downward pressure on the wages of similar native workers in these states, a pressure that is largely masked in estimates at the national level.

## Basic trends in immigration and wages

**Figure A** shows the share of the U.S. population between 1900 and 2007 that is foreign-born. In 1910, the peak immigrant share of the last century, immigrants made up 14.7% of the U.S. population. The immigrant share declined dramatically, to 4.7%, over the six decades from 1910 to 1970. In the last 40 years, however, immigration has been on a steady upward climb—by 2007, 12.6% of the population was foreign born.

As immigrant flows have surged in the last few decades, interest in the effect of immigration on the labor market outcomes of native workers has, unsurprisingly, increased dramatically.

This section focuses on the 14-year period from 1993 to 2007. The data used are from the Current Population Survey (CPS), which started tracking immigration status in 1994. (Because respondents are asked information about the previous year, data since 1993 are available. A full description of the data used is given in Appendix A.)

**Figure B** shows the immigrant share of total hours worked each year. In 1993, immigrants contributed 9.9% of total hours worked in this country; by 2007, immigrants were contributing 15.8%. This increase was driven


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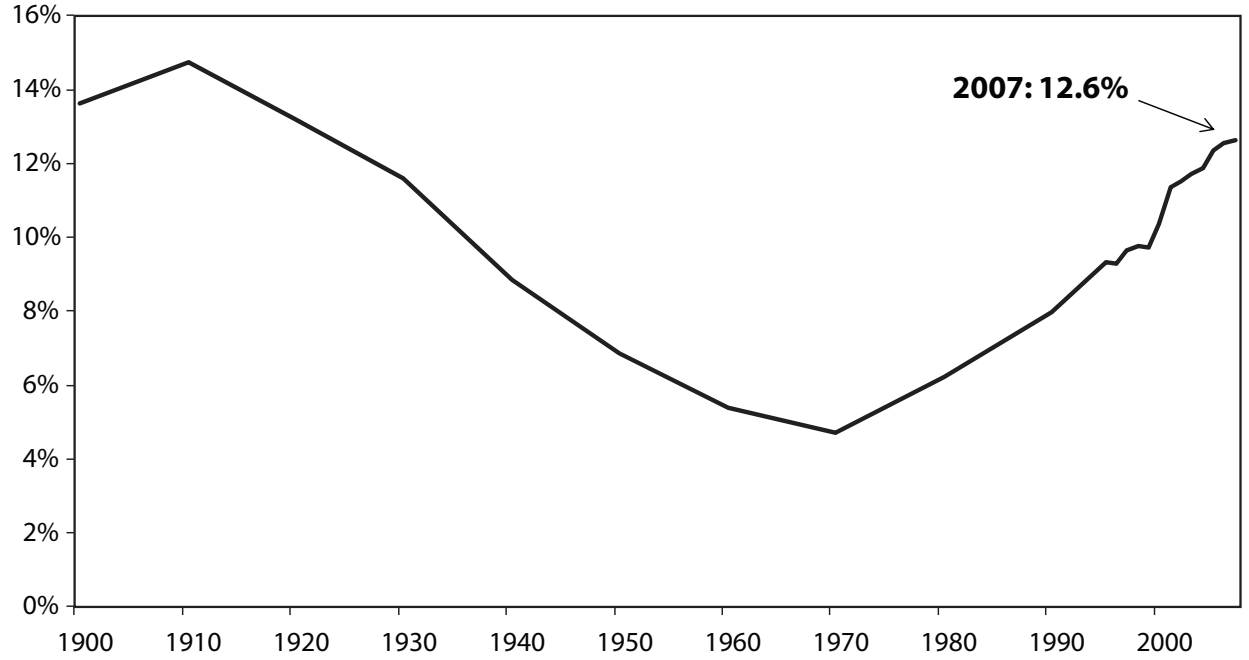
FIGURE A

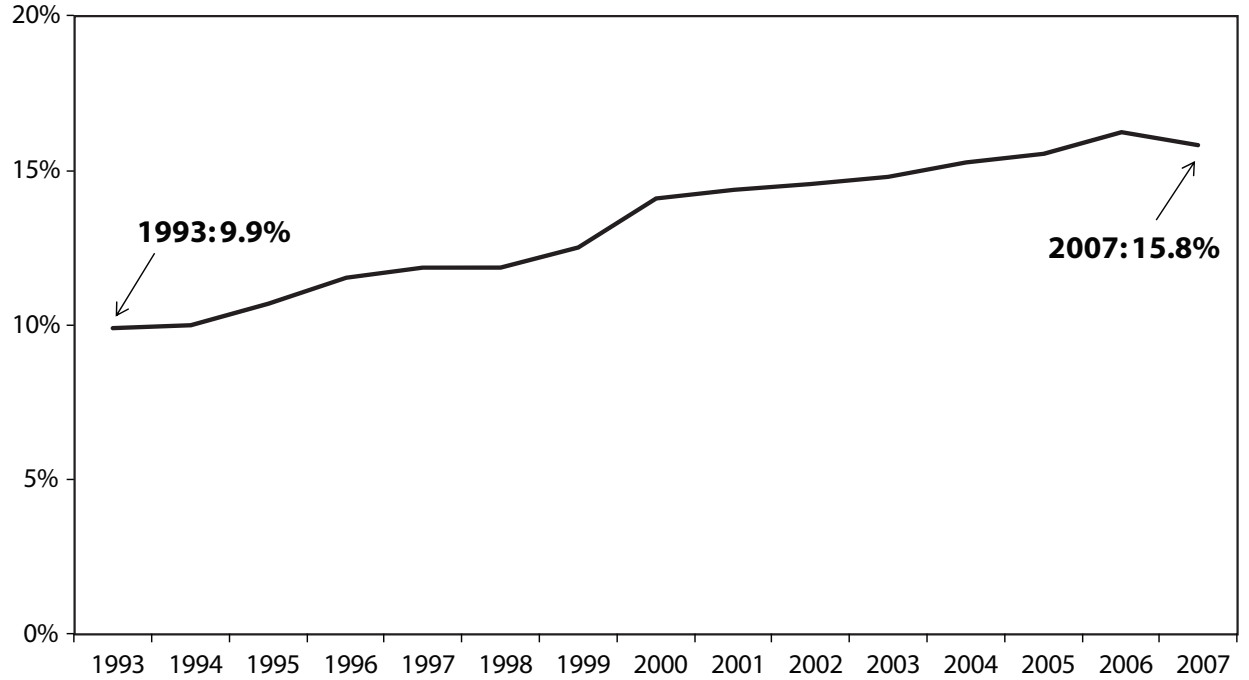
**Foreign-born population as a share of total U.S. population, 1900 to 2007**




**SOURCE:** 900-90 data from Bureau of the Census "We the American...Foreign Born"; 1995-2004 data from Bureau of the Census Foreign Born Population Annual Data Tables; 2005-07 data from American Community Survey Tables.

FIGURE B

**Immigrant share of total hours worked each year, 1993 to 2007**




**SOURCE:** EPI analysis of CPS data.


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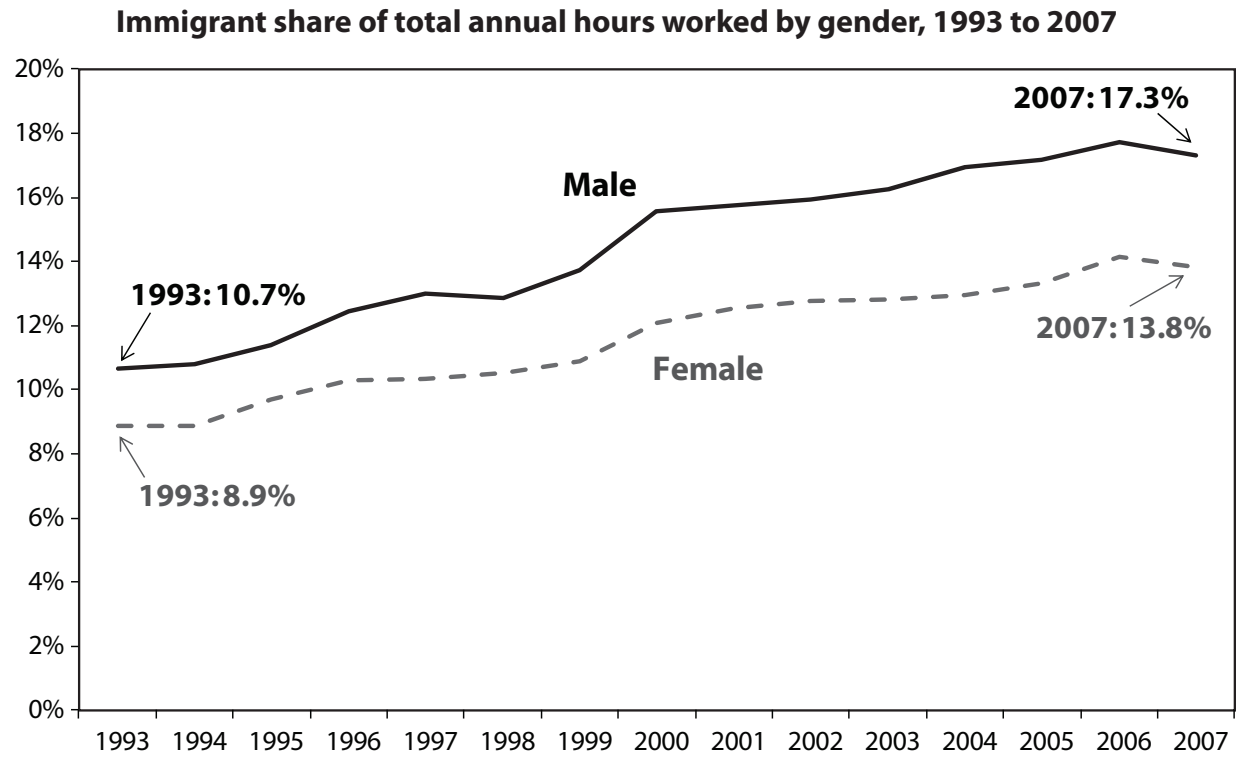
FIGURE C




**SOURCE:** EPI analysis of CPS data.

by the addition of 9.6 million foreign-born workers over this period.

## Gender

There have been increases in both female and male immigration: from 1993 to 2007, 3.8 million female immigrant workers and 5.8 million male immigrant workers were added to the U.S. workforce. **Figure C** shows the immigrant share of total hours worked among men and women separately. Immigrants make up a somewhat larger share of the male workforce, and the difference had been growing up to 2004. Since then, the difference has narrowed slightly. By 2007, immigrants made up 13.8% of the labor supply among women and 17.3% of the labor supply among men.

## Education levels

The inflow of immigrants has been unequal across detailed education categories, a fact of key importance in the debate on the labor market effects of immigration. **Figure D** shows the immigrant share of total hours worked among workers with less than a high school degree, a high school degree but no additional schooling, some college training but no college degree, and a college degree or more. Immigrants make up a much larger and faster-growing share of the less-than-high-school category in comparison to other education categories. The immigrant share among workers with less than a high school degree rose from 28.4% in 1993 to 47.5% in 2007, while the immigrant share among workers with a college degree or more rose from 9.9% to 14.8% from 1993 to 2007.

It is important to note that because workers with less than a high school degree make up a small (and shrinking) portion of the labor force (9.9% in 2007), high immigrant shares in this category do not actually represent a disproportionate *number* of new immigrants relative to other categories. And similarly, since workers with a college degree make up a relatively large (and growing) portion of the labor force (32.8% in 2007), low immigrant shares in this category represent a surprisingly large number


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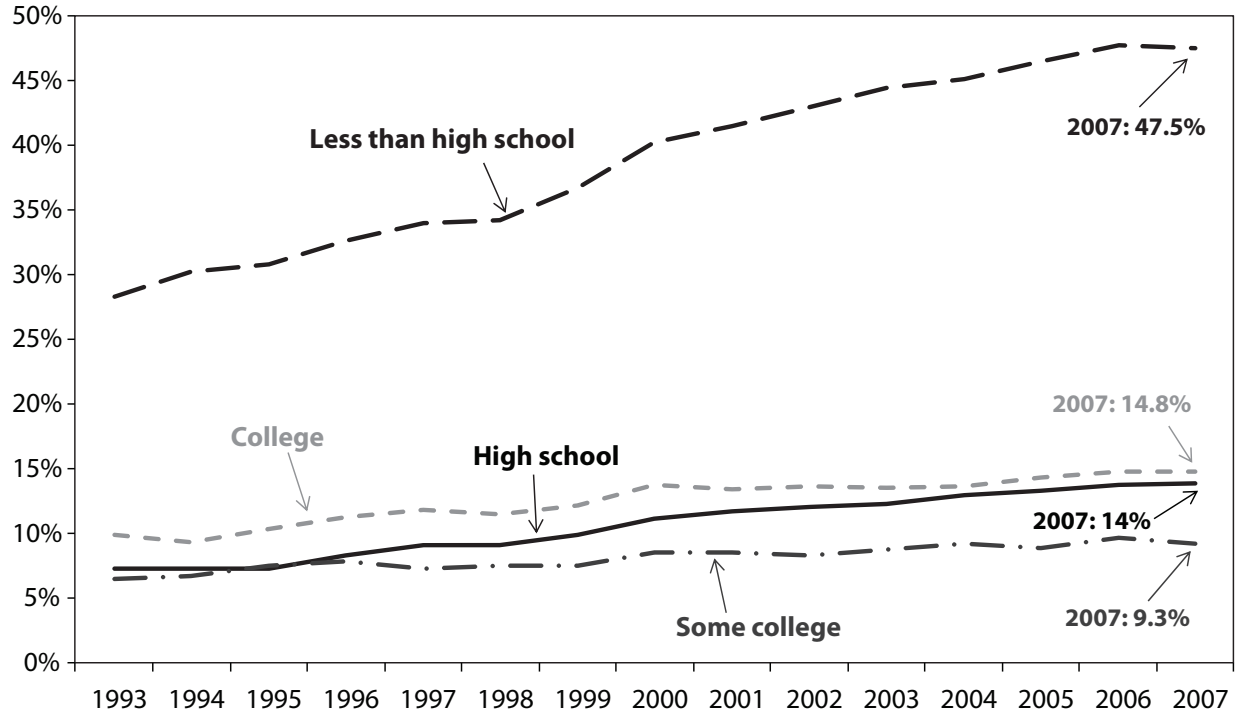
FIGURE D

**Immigrant share of total annual hours worked by level of education, 1993 to 2007**




**SOURCE:** EPI analysis of CPS data.

of new immigrants. From 1993 to 2007, there was an increase of 2.2 million immigrants with less than a high school degree, an increase of 2.5 million with exactly a high school degree, an increase of 1.4 million with some college training, and an increase of 3.5 million with a college degree.

**Table 1** gives, by education category, the percentage increase from 1993 to 2007 in hours worked that was due to new immigrants (or the increase from 1993 to 2007 in hours worked by immigrants relative to the total hours worked by immigrants and natives in 1993). Immigration led to a 21.2% increase in total labor supply among workers with less than a high school degree, an 11.9% increase among those with a college degree, and much smaller percentage increases among workers with education levels in between. That is, immigration patterns into the United States are marked by high immigration at very low levels

TABLE 1

**Percentage increase in hours worked due to immigration by education, 1993 to 2007**

| | Increase in hours worked due to immigration | | Increase in hours worked due to immigraion |
|---|---|---|---|
| *Less than high school* | 21.2% | High school or less | 10.2% |
| *High school* | 6.9 | | |
| *Some college* | 4.6 | More than high school | 8.3 |
| *College* | 11.9 | | |

**SOURCE:** EPI analysis of CPS data.


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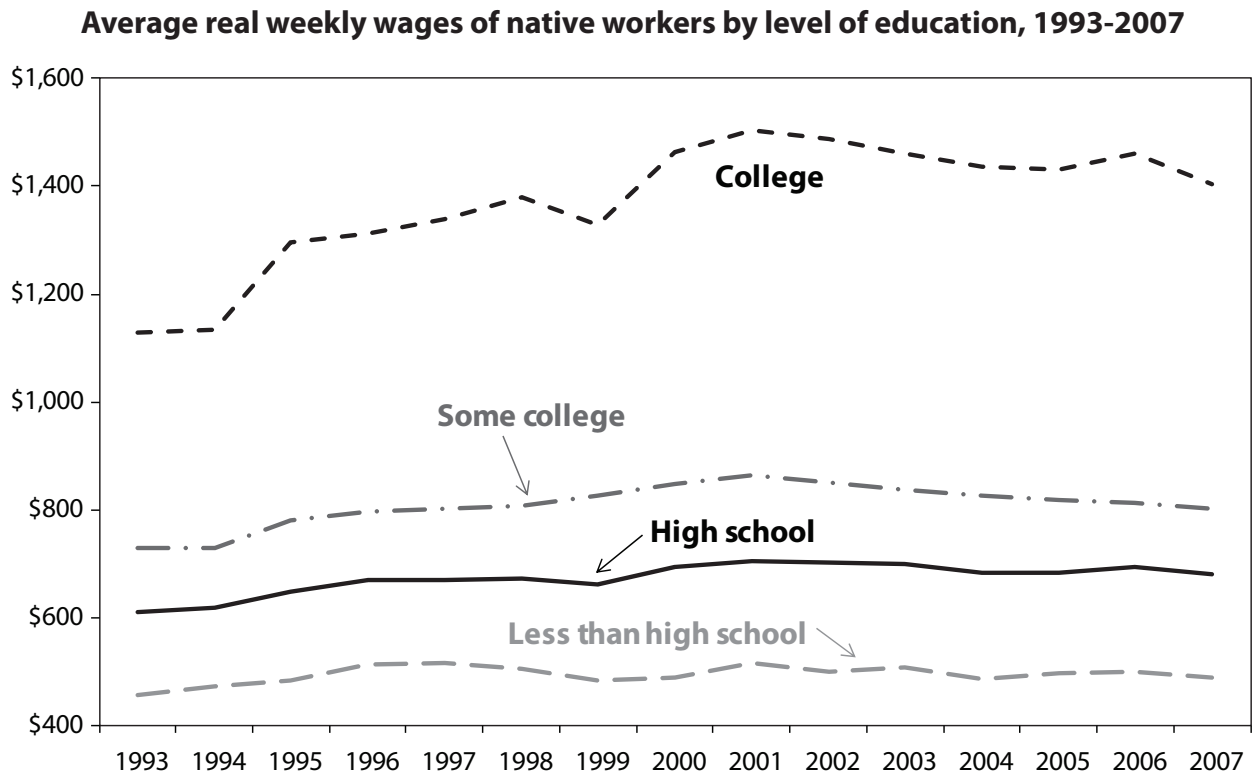
FIGURE E




**SOURCE:** EPI analysis of CPS data.

of education, high immigration at very high levels of education, and much less immigration between those poles.

The right half of Table 1 shows a further aggregation by education. When breaking workers into just two education categories, high school or less and more than high school, we see that immigration has been quite balanced over these two categories over the last 15 years, with "high school or less" seeing an increase in labor supply of 10.2% due to immigration, and "more than high school" seeing an increase of 8.3%. Perhaps surprisingly, immigration over the last 15 years has been roughly the same among "low schooling" and "high schooling" workers.

**Figure E** shows the average real (inflation-adjusted) weekly wage from 1993 to 2007 by education category. Native-born workers with less than a high school degree made an average of $456 per week in 1993, and that increased by less than 8% to $489 per week in 2007. Workers with a college degree or more made an average of $1,129 per week in 1993, and that increased by nearly 25% to $1,404 per week in 2007. Workers with a college degree saw much greater gains over this period than any other group—in 1993, the average college-educated worker made 2.5 times what a worker without a high school degree made, but by 2007, the ratio had risen to 2.9. One question addressed in this paper is how much of this increased inequality can be attributed to immigration.

**Figure F** shows average weekly wages for native workers over time by gender for just two education groups, workers with less than a high school education and workers with a college degree or more. In both education categories over this period, the female average weekly wage is roughly two-thirds of the male average weekly wage. Inequality has increased among both men and women—in 1993, the average college-educated female made 2.6 times what a female worker without a high school degree made, and the ratio was 2.5 among men. By 2007, the ratio had risen to 3.0 for both. The methodology used later in this paper will allow us to examine the effects of immigration on wages by gender, including its impact on inequality among both men and women.


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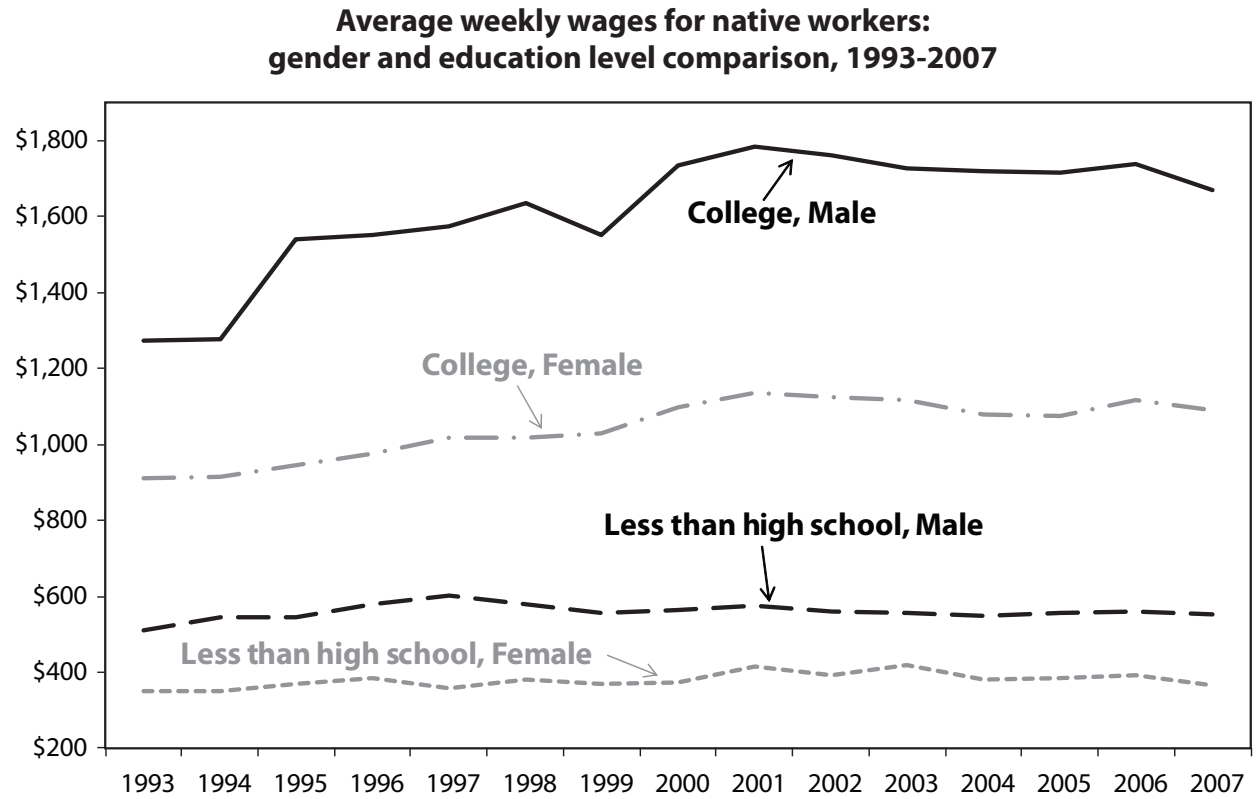
FIGURE F




**SOURCE:** EPI analysis of CPS data.

## A brief look at the recent advancements in the research

There is currently no consensus in the economic literature on the effect of immigration on the labor market outcomes of various groups of native workers. In fact, there is considerable disagreement among reputable researchers. Raphael et al. (2007) provide a very readable review of the literature on the effects of immigration on native labor market outcomes, and a more detailed review of the literature pertaining to the two advancements in the literature discussed below can be found in Ottaviano and Peri (2008).

### *Area vs. national*

Broadly speaking, there have been two main methodological strategies for studying the effect of immigration on the wages of native workers. The "area approach," dominated by the work of David Card, exploits the fact that there are large differences across regions of the United States in the relative size of the immigrant population. Essentially, this approach compares the wages of native workers in U.S. metropolitan areas with small immigrant inflows to the wages of native workers in U.S. metropolitan areas with large immigrant inflows. Research using this approach (see, for example, Card (2001) and Card (2007)) generally finds very modest, and sometimes modestly positive, effects of immigration on the wages of native workers, including workers with low levels of education.

The second main approach in this literature is the "national approach." Scholars using this approach often contend that it is impossible to suitably account for the fact that there may be movement of capital and native-born labor between metropolitan areas in response to immigration, and that this means that an analysis of the effect of immigration on native wages must use national-level data. This approach is dominated by the work of George Borjas, and tends to use a production function framework that combines workers of different skills, estimates the degree of substitutability between workers of different skills using national data, and simulates the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impact on wages of relative labor supply shifts due to immigration. Historically, research using this approach (see, for example, Borjas, Freeman, and Katz (1997) and Borjas (2003)) found relatively large negative effects of immigration on the wages of native workers, especially those with low levels of education.

## *Two advancements in the national approach*

Until recently, that is where the main divide in the literature stood, with researchers using the "area approach" finding no or little effect of immigration on the wages of native workers, including workers with low levels of education, and with those researchers using the "national approach" finding a relatively large negative effect, especially on workers with low levels of education. However, in the last couple of years there have been two important advancements in the literature on immigration and wages that help shed light on the differences in results between these two approaches. Both are somewhat complicated to derive but are extremely intuitive conceptually. This paper provides the intuition; see Ottaviano and Peri (2008) for a more detailed explanation.

Both advancements have to do with what economists refer to as "elasticities of substitution." In a labor market context, essentially what an elasticity of substitution measures is how substitutable one type of labor is for another. For example, consider a firm that hires graphic designers. To the employer, left-handed designers may be perfectly substitutable for right-handed designers, meaning that the elasticity of substitution between left-handed and right-handed designers is very large or infinite. Conversely, a graphic designer who does not know the graphic design software the firm uses is likely not very substitutable for one who does, so that the elasticity of substitution between these two types of workers is small. In other words, the more substitutable two types of workers are, the higher the elasticity of substitution between them.

Elasticities of substitution have enormous importance in estimates of changes in labor supply on wages (which include estimates of the effect of increased immigrant labor supply on native wages). If two types of workers are very substitutable for one another—if the elasticity of substitution between them is high—then an increase in the labor supply of one type can cause a reduction in wages not just in that type but also in the type that they are substitutes for. On the other hand, if two types of workers are not good substitutes, then an increase in the labor supply of one type will likely not cause a reduction in wages of the other. In fact, it may *increase* the wages of the other if the two types of workers are complements in some way so that as the supply of one type increases, the demand for the other type increases as well (for example, an increase in the supply of taxi drivers may cause an increase in demand for dispatchers, and therefore bid up the wages of dispatchers).

***Immigrant/native substitutability.*** The first recent advancement in the immigration and wages literature has been the identification of a small but detectable level of imperfect substitution between immigrant and native workers who have the same levels of education and experience (see, for example, Ottaviano and Peri (2008), Card (2009), Manacorda et al. (2005) and D'Amuri et al. (2008)). In other words, immigrant and native workers with the same levels of education and experience are not perfectly substitutable. This may arise, for example, among workers with low levels of education if native workers are more likely to be concentrated in jobs that require strong English skills and immigrant workers are more likely to be more concentrated in jobs that do not (for example, waitstaff versus line cooks). Previous national approach estimates of the effect of immigration on wages have assumed that immigrants and natives of similar education and experience levels are perfectly substitutable. Correctly characterizing the elasticity of substitution between immigrants and natives is of enormous importance, because, as explained above, if natives and immigrants are perfectly substitutable, an increase in immigration in a particular education/experience class will tend to reduce the wages in the entire education/experience class, including native workers in that class. However if, as has been shown to be the case, immigrants and natives within the same education/experience class are imperfect substitutes, then an increase in immigration in a particular class will have a strong adverse effect on the wages of *earlier immigrants* in that class—since they are direct substitutes, or competitors—but have a smaller effect on the native workers in that class.


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***Substitutability by educational attainment.*** The second recent advancement has been the application to the immigration and wages literature of something that was already accepted as fact in the rest of the labor economics literature: that the elasticity of substitution is not constant across education categories. To understand the intuition behind this, consider a broad grouping of workers by education level: workers with a high school education or less and workers with more than a high school education. The labor economics literature has long established (see, for example, Katz and Murphy (1992)) that these two groups are not good substitutes for each other—workers with a high school degree or less tend to do different jobs than workers with more than a high school degree.

Now consider a subgrouping of the high school or less category into two additional groups—workers with no high school degree and workers with exactly a high school degree. There is a much greater degree of substitutability between these two types of workers. Workers with less than a high school degree are more likely to do similar jobs as those with exactly a high school degree. These comparisons suggest that the elasticity of substitution between two education categories varies depending on which two education categories are being considered.

Previous national approach estimates of the effect of immigration on wages have essentially assumed that the elasticity of substitution between workers in two different education categories is the same regardless of which pair of education categories is being considered. But it turns out that incorporating different elasticities of substitution between different pairs of education categories is enormously important to estimates of the effect of immigration on native wages. The main problem with ignoring this point arises with what it implies—that workers without a high school degree and workers with a high school degree have very low levels of substitutability. This is strongly refuted by the literature (see, for example, Ottaviano and Peri (2008) and Card (2009)). Both of these studies show empirically that there is a relatively high degree of substitutability between workers without a high school degree and workers with exactly a high school degree.[1]

Ignoring this fact distorts the estimated effects of immigration on workers without a high school degree, since it suggests that an increase in immigration among workers without a high school degree affects only workers without a high school degree, which is a very small portion of the labor force (9.9% in 2007), so that essentially the entire impact of "less-than-high-school" immigration is assumed to be felt by the relatively small number of "less-than-high-school" workers. If, on the other hand, we recognize that workers without a high school degree are relatively substitutable for workers with a high school degree, then the impact of "less-than-high-school" immigration is more diffused across the much larger share of the workforce that has a high school degree or less (38.7% in 2007), greatly reducing the impact on the least-educated American workers.

These new innovations in the national approach literature essentially solve the earlier divide between the national approach and the area approach. When the key elasticities of substitution are correctly accounted for in the national approach methodology, the results using that approach come in line with the results from the area approach, namely that the effects of immigration on native workers is modest, including the effect on native workers with low levels of education.

## Estimates of the effect on immigration on wages

### *Methodology for computing this effect*

This analysis computes the effect of immigration on wages using an approach outlined in Ottaviano and Peri (2008), which is based on standard practice in the national approach literature on immigration and wages but incorporates the two advancements described above. Within that general approach, we use consensus estimates from the labor economics literature of the relevant elasticities, along with our own calculations of changes in immigrant and native labor supply using the CPS data described in Appendix A. We then simulate the impact of immigration on relative wages using these components. As is standard with this approach, there are no confidence intervals for the estimates; the methodology employed here does not easily lend itself to calculating standard errors. To ensure that sample sizes are large enough for our estimations of the effect of immigration on wages, we pool 1993 and 1994 data for a "year 1994" sample, and pool 2006 and 2007 data for a "year 2007" sample. We then calculate


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the impact of immigration over the resulting 13-year period. A more detailed description of the methodology is given in Appendix B.

It is important to note that the methodology employed here estimates only the *relative* wage effects of immigration (for example, how immigration affects native high school dropouts compared to other workers,) and not the absolute wage effects of immigration. The framework we use (and that is used in the "national approach" more generally) *assumes* that the economy adjusts to absorb new immigrants and that the overall real wage effect of immigration in the long run is zero. Note that the results in, for example, Table 2 show that the overall impact is zero; this is an assumption, not an estimate. Our estimates are in the *relative* impacts found between subgroups—in how much immigration affects one subgroup of workers compared to another.

## Education

**Table 2** presents the impact of immigration from 1994-2007 on the wages of U.S.- and foreign-born workers separately and for all workers combined. For each group (U.S.-born, foreign-born, and all) there are three columns representing different sets of elasticities. The different sets reflect the fact that for each relevant elasticity, there is a range of estimates in the labor literature. (The ranges are given in Appendix B, along with an explanation of how these elasticities are generally estimated.) The column "low" assumes that the substitutability of workers in different education categories is at the low end of the range, and that the substitutability of natives and immigrants within the same education/experience class is at the high end of the range, both of which, as discussed above, will give the gloomiest outlook for the effect of immigration on the wages of natives with low levels of schooling. Conversely, the column "high" assumes that the substitutability of workers in different education categories is at the high end of the range, and that the substitutability of natives and immigrants within the same education/experience class is at the low end of the range, both of which will give the rosiest outlook for the effect of immigration on the wages of natives with low levels of schooling. The column "typical" assumes a typical set of elasticities, neither at the high end or low end of their respective ranges, and these columns represent the estimates we believe to be the most accurate.

Looking first at the "All" category, we find that the effect of immigration from 1994 to 2007 was to reduce the wages of workers with less than a high school degree, relative to other workers, by somewhere between -1.4% and -0.4%, most likely by -0.7%. But looking at the breakdown by immigration status, we find that the burden of these losses is shouldered entirely by foreign-born workers, who saw a relative reduction in wages of -3.7%, compared to a modest increase of 0.3% among native workers. *In other words, the surge in immigration among workers with less than a high school degree served to lower the wages of earlier immigrant workers with less than a high school degree, not native workers with less than a high school degree.*

**TABLE 2**

**Impact of immigration on wages from 1994 to 2007 by education level**

| | U.S.-born | | | Foreign-born | | | All | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Low* | *High* | *Typical* | *Low* | *High* | *Typical* | *Low* | *High* | *Typical* |
| *Less than high school* | -0.7% | 1.0% | 0.3% | -3.3% | -4.3% | -3.7% | -1.4% | -0.4% | -0.7% |
| *High school* | 0.3 | 0.4 | 0.3 | -2.9 | -6.1 | -4.5 | 0.1 | -0.1 | 0.0 |
| *Some college* | 0.6 | 0.8 | 0.7 | -1.9 | -4.3 | -3.1 | 0.5 | 0.4 | 0.4 |
| *College* | 0.2 | 0.5 | 0.4 | -3.8 | -7.4 | -5.6 | -0.2 | -0.2 | -0.2 |
| **All** | **0.3** | **0.6** | **0.4** | **-3.2** | **-6.0** | **-4.6** | **0.0** | **0.0** | **0.0** |

**SOURCE:** EPI analysis of CPS data.


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**TABLE 3**

## Results using incorrectly characterized elasticities

| | U.S.-born | Foreign-born | All |
|---|---|---|---|
| *Less than high school* | -6.2% | -6.1% | -6.2% |
| *High school* | 1.2 | 1.2 | 1.2 |
| *Some college* | 1.9 | 1.9 | 1.9 |
| *College* | -1.1 | -1.1 | -1.1 |
| **All** | **0.1** | **-0.9** | **0.0** |

**SOURCE:** EPI analysis of CPS data.

This story is retold in each education category—the impact on overall wages in each category is modest, but when looking at breakdowns by immigration status, we find that immigrants in the category see sizeable negative effects and natives see small positive effects. Looking at all education categories combined, we find that the overall effect of immigration from 1994-2007 was to reduce the wages of the foreign-born population by 4.6%, relative to an increase in the wages of the U.S.-born population of 0.4%.

### *Mischaracterized elasticities*

**Table 3** demonstrates the importance of correctly characterizing the elasticities. This table shows what the estimates would be if we were (incorrectly) to assume that the elasticity of substitution is constant across education categories, and that immigrants and natives within the same education/experience class are perfect substitutes. Results in the table would suggest that the burden of increased immigration over these 13 years was shouldered largely by workers without a high school degree, and in

**TABLE 4**

## Impact of immigration on wages by education level, 1994-2007

| | U.S.-born | | | Foreign-born | | | All | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Low* | *High* | *Typical* | *Low* | *High* | *Typical* | *Low* | *High* | *Typical* |
| **Female** | | | | | | | | | |
| *Less than high school* | 0.6% | 1.7% | 1.1% | -1.8% | -3.1% | -2.5% | 0.1% | 0.6% | 0.3% |
| *High school* | 1.5 | 1.2 | 1.1 | -1.0 | -3.9 | -2.6 | 1.3 | 0.8 | 0.9 |
| *Some college* | 0.1 | 0.4 | 0.3 | -2.5 | -4.8 | -3.6 | -0.1 | 0.1 | 0.1 |
| *College* | -0.4 | 0.2 | 0.0 | -5.1 | -9.3 | -7.1 | -0.8 | -0.7 | -0.7 |
| **All** | **0.3** | **0.6** | **0.4** | **-3.2** | **-6.3** | **-4.7** | **0.0** | **0.0** | **0.0** |
| **Male** | | | | | | | | | |
| *Less than high school* | -1.5% | 0.5% | -0.2% | -4.3% | -5.1% | -4.4% | -2.3% | -1.0% | -1.4% |
| *High school* | -0.5 | -0.2 | -0.2 | -4.2 | -7.7 | -5.8 | -0.8 | -0.7 | -0.6 |
| *Some college* | 1.0 | 1.0 | 0.9 | -1.4 | -3.9 | -2.7 | 0.8 | 0.7 | 0.7 |
| *College* | 0.6 | 0.8 | 0.7 | -2.8 | -6.2 | -4.6 | 0.3 | 0.2 | 0.2 |
| **All** | **0.3** | **0.6** | **0.4** | **-3.1** | **-5.9** | **-4.5** | **0.0** | **0.0** | **0.0** |

**SOURCE:** EPI analysis of CPS data.


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particular that native workers in this category have experienced large negative wage impacts. What this exercise demonstrates is that the large negative values found in the traditional "national" approach to estimating the effect of immigration on wages are due primarily to incorrect characterizations of key elasticities.

## Gender

**Table 4** shows the results (once again with appropriately characterized elasticities) separately for men and women. Looking first at the overall effect for U.S.-born workers by gender, we find that both men and women have seen a relative increase in wages of 0.4% due to immigration from 1994 to 2007, compared to a loss by earlier immigrants of around 4.6%. However, the breakdowns by education are somewhat different. U.S. women with lower levels of education gain more from immigration than female workers with higher levels of education, whereas U.S. men with lower levels of education see modest declines compared to male workers with higher levels of education (who have seen modest increases). In particular, we find that the effect of immigration from 1994 to 2007 was to increase the wages of U.S.-born women with less than a high school degree, relative to other workers, by somewhere between 0.6% and 1.7%, most likely by 1.1%, and to change the wages of U.S.-born men with less than a high school degree, relative to other workers, by somewhere between -1.5% and 0.5%, most likely by -0.2%.

**Table 5** can shed some light on this difference. Table 5 is similar to Table 1, which shows increased hours worked from 1993 to 2007 due to immigration, but it is broken out by gender. While the increase in hours worked due to immigration is fairly balanced between "less than or equal to high school" and "more than high school," there are gender differences. Among women, there have been slightly greater increases in hours in the more-educated group than in the less-educated group, whereas among men, there have been somewhat greater increases in hours in the less-educated group than in the more highly educated group. These differences help explain why native women with lower levels of education gain due to immigration (1.1% increase in wages), whereas native men with lower levels of education see modest declines (-0.2% decrease in wages).

## Inequality

The estimates presented above show that immigration from 1994 to 2007 had a modest positive effect on the overall wages of both male and female native workers (0.4% relative increase). Within that overall change, women with less than a high school education experienced a nontrivial

**TABLE 5**

**Impact of immigration on wages from 1994 to 2007 by gender and education**

| | Increase in hours worked due to immigration | | Increase in hours worked due to immigraion |
|---|---|---|---|
| **Female** | | | |
| *Less than high school* | 16.4% | High school or less | 7.3% |
| *High school* | 5.1 | | |
| *Some college* | 5.0 | More than high school | 9.0 |
| *College* | 13.6 | | |
| **Male** | | | |
| *Less than high school* | 23.6% | High school or less | 12.2% |
| *High school* | 8.3 | | |
| *Some college* | 4.3 | More than high school | 7.7 |
| *College* | 10.8 | | |

**SOURCE:** EPI analysis of CPS data.


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**TABLE 6**

## How much of the increasing wage inequality from 1994 to 2007 can be explained by immigration?

| | U.S.-born | | | Foreign-born | | | All | | |
|---|---|---|---|---|---|---|---|---|---|
| | *All* | *Female* | *Male* | *All* | *Female* | *Male* | *All* | *Female* | *Male* |
| **Growth in less than high school wages** | 7.2% | 3.9% | 8.1% | 9.9% | 10.4% | 9.2% | 5.4% | 5.0% | 4.6% |
| **Growth in college wages** | 24.3 | 19.7 | 31.2 | 29.4 | 26.2 | 33.5 | 24.6 | 20.1 | 31.0 |
| **Difference in growth rates** | 17.2 | 15.7 | 23.1 | 19.5 | 15.9 | 24.3 | 19.2 | 15.1 | 26.3 |
| **Growth in less than high school wages due to immigration** | 0.3% | 1.1% | -0.2% | -3.7% | -2.5% | -4.4% | -0.7% | 0.3% | -1.4% |
| **Growth in college wages due to immigration** | 0.4 | 0.0 | 0.7 | -5.6 | -7.1 | -4.6 | -0.2 | -0.7 | 0.2 |
| **Difference in growth due to immigration** | 0.1 | -1.2 | 0.9 | -1.9 | -4.6 | -0.1 | 0.5 | -0.9 | 1.5 |
| **Portion of difference in growth rates that is due to immigration** | 0.3% | -7.5% | 3.9% | -9.7% | -29.0% | -0.6% | 2.8% | -6.1% | 5.8% |

**SOURCE:** EPI analysis of CPS data.

increase (1.1%), while women with a college degree saw no change due to immigration, so immigration likely decreased inequality among women over this period. On the other hand, men with less than a high school education experienced a modest decline (-0.2%), while men with a college degree saw a modest increase (0.7%), so immigration likely was a factor in increasing inequality among men over this period.

**Table 6** uses the estimates of the relative wage impacts of immigration to quantify how much of the growth over this period in wage inequality between workers with less than a high school degree and workers with a college degree or more can be explained by immigration. The table shows the difference in wage growth rates from 1994-2007 for workers with less than a high school degree and workers with a college degree or more, and it shows the difference in the effect of immigration on wages for both groups (the latter taken from the "typical" estimates in Tables 2 and 4, above). The final row shows the difference in growth rates due to immigration divided by the difference in wage growth rates—in other words, it gives the share of the difference in wage growth rates that is due to immigration. This is the measure we use of the amount of increased inequality over this period that can be attributed to immigration.

For native workers, only 0.1 percentage point of the 17.2 percentage-point difference in growth rates between "less than high school" and "college or more" can be explained by immigration. However, this overall effect masks differences by gender. Immigration decreased inequality among native women—the differences in growth rates between the two education groups would have been 7.5% higher in the absence of female immigration. Among men, 0.9 percentage points of the 23.1 percentage-point difference in growth rates between the two education categories can be explained by immigration.

For foreign-born workers of both genders, but particularly for women, immigration caused larger wage declines among college workers than among less than high school workers, so new immigration reduced inequality among immigrants. However, because immigration is nevertheless concentrated at the high end and low end of the overall wage distribution, increased immigration increases overall wage inequality. We find that immigration contributed 2.8% of the increase in inequality overall, though the effect was concentrated among men. Among women, the difference in wage growth rates between the two education groups would have been 6.1% higher without immigration, but immigration contributed 5.8% of the overall increased inequality among men. In sum, immigration has


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**TABLE 7**

## Impact of immigration on wages from 1994 to 2007 by gender, education, and age

| | U.S.-born | | | Foreign-born | | | All | | |
|---|---|---|---|---|---|---|---|---|---|
| | *All* | *Female* | *Male* | *All* | *Female* | *Male* | *All* | *Female* | *Male* |
| **Less than high school** | | | | | | | | | |
| **All** | 0.3% | 1.1% | -0.2% | -3.7% | -2.5% | -4.4% | -0.7% | 0.3% | -1.4% |
| ***18-27*** | 1.8 | 3.0 | 1.2 | -0.3 | 1.8 | -1.1 | 1.2 | 2.7 | 0.4 |
| ***28-37*** | 0.5 | 2.0 | -0.4 | -2.6 | -0.1 | -3.8 | -0.5 | 1.4 | -1.5 |
| ***38-47*** | -0.9 | -0.2 | -1.3 | -6.2 | -5.4 | -6.9 | -2.3 | -1.6 | -2.8 |
| ***48-57*** | 0.4 | 0.6 | 0.1 | -5.8 | -5.2 | -6.4 | -0.6 | -0.5 | -0.9 |
| **High school** | | | | | | | | | |
| ***All*** | 0.3% | 1.1% | -0.2% | -4.5% | -2.6% | -5.8% | 0.0% | 0.8% | -0.6% |
| ***20-29*** | 0.5 | 1.3 | 0.0 | -3.1 | -2.0 | -3.7 | 0.2 | 1.1 | -0.3 |
| ***30-39*** | 0.4 | 1.3 | -0.1 | -3.9 | -1.5 | -5.5 | 0.2 | 1.1 | -0.5 |
| ***40-49*** | 0.2 | 1.1 | -0.5 | -4.8 | -2.5 | -6.8 | -0.2 | 0.8 | -0.9 |
| ***50-59*** | 0.2 | 0.8 | -0.3 | -6.9 | -5.4 | -8.0 | -0.2 | 0.4 | -0.7 |
| **Some college** | | | | | | | | | |
| ***All*** | 0.7% | 0.3% | 0.9% | -3.1% | -3.6% | -2.7% | 0.4% | 0.1% | 0.7% |
| ***22-31*** | 1.2 | 0.9 | 1.4 | 0.1 | -0.1 | 0.2 | 1.1 | 0.8 | 1.3 |
| ***32-41*** | 0.9 | 0.5 | 1.2 | -1.6 | -2.3 | -1.0 | 0.8 | 0.4 | 1.0 |
| ***42-51*** | 0.4 | 0.1 | 0.6 | -5.5 | -5.2 | -5.9 | 0.1 | -0.3 | 0.2 |
| ***52-61*** | -0.2 | -0.9 | 0.3 | -8.4 | -10.9 | -6.4 | -0.7 | -1.5 | -0.1 |
| **College** | | | | | | | | | |
| ***All*** | 0.4% | 0.0% | 0.7% | -5.6% | -7.1% | -4.6% | -0.2% | -0.7% | 0.2% |
| ***24-33*** | 0.6 | 0.2 | 0.9 | -5.1 | -6.7 | -4.0 | 0.2 | -0.3 | 0.5 |
| ***34-43*** | 0.6 | 0.1 | 0.9 | -4.2 | -6.1 | -3.2 | 0.2 | -0.4 | 0.5 |
| ***44-53*** | 0.4 | -0.1 | 0.7 | -5.3 | -6.5 | -4.6 | -0.1 | -0.7 | 0.2 |
| ***54-63*** | -1.0 | -1.6 | -0.6 | -10.9 | -14.1 | -9.1 | -2.0 | -2.8 | -1.4 |
| **All** | | | | | | | | | |
| ***All*** | 0.4% | 0.4% | 0.4% | -4.6% | -4.7% | -5.9% | 0.0% | 0.0% | 0.0% |
| ***Age Group 1*** | 0.8 | 0.7 | 0.8 | -2.7 | -3.3 | -2.5 | 0.5 | 0.4 | 0.5 |
| ***Age Group 2*** | 0.6 | 0.6 | 0.7 | -3.4 | -3.6 | -3.3 | 0.3 | 0.3 | 0.3 |
| ***Age Group 3*** | 0.3 | 0.3 | 0.3 | -5.4 | -5.1 | -5.6 | -0.2 | -0.2 | -0.2 |
| ***Age Group 4*** | -0.3 | -0.3 | -0.2 | -8.5 | -9.1 | -7.9 | -1.0 | -1.0 | -0.9 |

**SOURCE:** EPI analysis of CPS data.

not been a significant contributor to wage inequality among native workers, but about 3% of the overall increase in inequality from 1994 to 2007 between college educated workers and high school dropouts can be attributed to immigration.

### *Age*

One question that arises in the debate on immigration and wages is the effect of immigration on the wages of young workers, especially young men with low levels of education. **Table 7** breaks down the effect of immigration on wages by age category and gender. Here and for the rest of the paper, unless otherwise noted, results are shown for the "typical" set of elasticities. Also note that, as is common practice in the labor economics literature, definitions of age categories are slightly different across education categories to reflect the fact that, for example,


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**TABLE 8**

**Education shares by age, gender, and race for non-Hispanic native workers , 2007**

| | White non-Hispanic U.S.-born workers | | | Black non-Hispanic U.S.-born workers | | |
|---|---|---|---|---|---|---|
| | *All* | *Female* | *Male* | *All* | *Female* | *Male* |
| *All* | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| *Less than high school* | 5.3 | 4.1 | 6.4 | 9.9 | 8.1 | 12.0 |
| *High school* | 28.3 | 25.9 | 30.3 | 35.1 | 32.3 | 38.3 |
| *Some college* | 30.1 | 32.0 | 28.5 | 33.7 | 36.0 | 31.0 |
| *College* | 36.3 | 38.0 | 34.8 | 21.4 | 23.6 | 18.7 |

**SOURCE:** EPI analysis of CPS data.

a worker with only a high school education is generally available to start work four years earlier than a worker with a college degree. The categories thus represent 10-year groupings of "potential labor market experience."

The results show that in fact *older* native workers face bigger impacts of the increasing foreign-born workforce over this period. Native workers with 31 to 40 years of potential labor market experience (age group 4) saw a modest decline of 0.3% in wages relative to native workers with one to 10 years of potential experience (age group 1) who saw a modest increase in wages due to immigration of 0.8%. The overall pattern generally holds across education categories, in particular, for native workers without a high school degree, 18-27-year olds of both genders gained due to immigration while it was middle-aged workers—workers age 38-47—who saw modest declines. These results provide no evidence that younger workers in any category are being particularly hard-hit by immigration relative to older workers.

## *Race*

The methodology used in this paper does not allow for a breakdown of the effect of immigration on U.S.-born workers in different education groups separately by race. However, using the estimated wage effects of immigration by education and experience group, we can aggregate the results separately for white and black native workers to look at the overall impact of immigration on these two groups. The differences in the overall effects by race will essentially reflect the fact that educational breakdowns are different for blacks and whites. Education breakdowns for 2007 for native blacks and native whites are given in **Table 8**. They show that native blacks have somewhat lower educational attainment than native whites, with a higher percentage of black native workers than white native workers not having a high school degree (9.9% vs. 5.3%), and a lower percentage of black native workers than white native workers having a college degree (21.4% vs. 36.3%). However, since (as Table 4 shows) the positive

**TABLE 9**

**Aggregate impact of immigration on wages from 1994 to 2007 of native workers by race**

| | White non-Hispanic U.S.-born workers | | | Black non-Hispanic U.S.-born workers | | |
|---|---|---|---|---|---|---|
| | *Low* | *High* | *Typical* | *Low* | *High* | *Typical* |
| *All* | 0.3% | 0.6% | 0.5% | 0.3% | 0.6% | 0.4% |
| *Female* | 0.4 | 0.6 | 0.5 | 0.3 | 0.5 | 0.4 |
| *Male* | 0.2 | 0.5 | 0.4 | 0.3 | 0.6 | 0.4 |

**SOURCE:** EPI analysis of CPS data.


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impact of immigration does not rise monotonically across education groups, it is not *a priori* obvious what the aggregate impact will be.

The overall impacts by race are given in **Table 9**. They show that in the aggregate, immigration has essentially the same relative effect on native blacks as it has had on native whites—a small positive relative impact on wages. These results reflect the fact that there is not a great deal of variation across education categories in the relative impact of immigration on wages, so even though blacks and whites have different education breakdowns, in aggregate the effect of immigration on wages is similar.

## Does the impact of immigration on wages vary with overall labor demand?

Over the period from 1994 to 2007, labor demand varied widely—in particular, from 1994-2000, the labor market was much stronger than it was in the later period. From 1994-2000, job growth averaged 2.5% per year, whereas from 2000 to 2003, which captures the period of job loss associated with the recession of 2001, employment declined 0.5% per year. From 2003 to 2007, employment growth picked up somewhat, growing at an average of 1.4% per year.

Immigration flows, unsurprisingly, respond to the conditions of the U.S. economy: from 1994 to 2000, 941,000 immigrant workers entered the United States each year, but from 2000 to 2003, the number plummeted to 342,000, and then picked up somewhat to an average of 502,000 per year from 2003 to 2007.

Was the impact of immigration on wages different over these three periods of very different overall labor demand? **Table 10** shows the impact of immigration on wages by gender and education separately for these three

**TABLE 10**

**Average annual impact of immigration on wages for periods of different overall labor demand**

| | U.S.-born | | | Foreign-born | | | All | | |
|---|---|---|---|---|---|---|---|---|---|
| | *All* | *Female* | *Male* | *All* | *Female* | *Male* | *All* | *Female* | *Male* |
| **1994-2000** | | | | | | | | | |
| *Less than high school* | 0.02% | 0.03% | 0.01% | -0.37% | -0.42% | -0.36% | -0.08% | -0.08% | -0.08% |
| *High school* | 0.02 | 0.03 | 0.01 | -0.42 | -0.35 | -0.48 | -0.01 | 0.00 | -0.02 |
| *Some college* | 0.07 | 0.05 | 0.07 | -0.27 | -0.27 | -0.27 | 0.04 | 0.03 | 0.05 |
| *College* | 0.04 | 0.03 | 0.04 | -0.50 | -0.51 | -0.50 | -0.01 | -0.02 | -0.01 |
| *All* | 0.04 | 0.04 | 0.04 | -0.42 | -0.41 | -0.43 | 0.00 | 0.00 | 0.00 |
| **2000-03** | | | | | | | | | |
| *Less than high school* | -0.04% | 0.04% | -0.10% | -0.28% | -0.09% | -0.39% | -0.13% | 0.00% | -0.21% |
| *High school* | -0.05 | 0.04 | -0.10 | -0.22 | -0.17 | -0.25 | -0.06 | 0.02 | -0.12 |
| *Some college* | 0.06 | 0.03 | 0.07 | -0.03 | -0.05 | -0.02 | 0.05 | 0.03 | 0.06 |
| *College* | 0.04 | 0.01 | 0.06 | -0.14 | -0.32 | -0.04 | 0.02 | -0.03 | 0.05 |
| *All* | 0.02 | 0.02 | 0.02 | -0.16 | -0.21 | -0.13 | 0.00 | 0.00 | 0.00 |
| **2003-07** | | | | | | | | | |
| *Less than high school* | 0.04% | 0.15% | -0.04% | -0.05% | 0.10% | -0.14% | 0.00% | 0.13% | -0.09% |
| *High school* | 0.04 | 0.15 | -0.04 | -0.15 | 0.06 | -0.30 | 0.02 | 0.14 | -0.07 |
| *Some college* | 0.03 | -0.01 | 0.06 | -0.17 | -0.24 | -0.11 | 0.01 | -0.02 | 0.04 |
| *College* | 0.01 | -0.02 | 0.04 | -0.23 | -0.33 | -0.16 | -0.02 | -0.06 | 0.02 |
| *All* | 0.03 | 0.02 | 0.03 | -0.18 | -0.19 | -0.17 | 0.00 | 0.00 | 0.00 |

**SOURCE:** EPI analysis of CPS data.


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periods. It should be noted that unlike the other tables in this paper, which report the impact over the entire period from 1994-2007, this table gives the average impact per year over each period for ease of comparison.

The results show that the main effect of the different periods is felt by immigrants themselves, who faced much larger negative effects during the period of greater immigration in the 1990s. For native workers overall, there was not large variation in the impact of immigration over the three periods, though the gains were greatest during the 90s, since immigration was higher. For workers with less than a high school education, there were some small differences: these workers experienced a modest relative decline of 0.04% per year due to immigration during the downturn of the early 2000s, compared to a modest relative increase in the other periods (0.02% in the 1990s and 0.04% from 2003-07). By gender, the differences were slightly larger—male workers with a high school education or less saw a relative decline of 0.1% per year due to immigration from 2000-03, whereas women with a high school education or less experienced a relative gain of 0.04% per year over this period.

The fact that the relative effect of immigration on wages does not vary dramatically over periods of dramatically different labor demand offers some limited evidence that immigrant-flow response to labor demand in the United States helps to smooth the effects of immigration on native wages across periods of strength and weakness in the U.S. labor market. While we do not have data that allow us to conduct our simulation on the current economic downturn, this analysis suggests that it is likely that the relative impact of immigration on the wages of native workers during the 2008/2009 recession will not be out of line with the relative impact experienced in earlier periods.

## *The effect of immigration in high-immigration states*

Immigrant flows vary widely by state. (**Table C1** in Appendix C shows immigrant flows by state from 1993 to 2007.) Here we examine the four states that have seen the largest increase in numbers of immigrant workers: California, Florida, New York, and Texas. Together, these four states represent 46% of all increases in immigrant workers over this period, though they made up only 32% of all workers in 2007. California saw an increase of 1.7 million immigrants from 1993 to 2007, Florida saw 824,000 new immigrants, New York 811,000, and Texas 1.1 million. Because these are the four largest states, we are able to conduct an analysis separately for each of these states without running into major sample size issues.

**Table 11** shows the results by education category and gender for these four states. In these high immigrant states, the overall effect of immigration is similar to the effect at the national level—small positive effects for native workers and nontrivial negative effects for earlier immigrant workers. By education category, however, there is some variation. In particular, in California and Texas, immigration has led to a decline in the relative wages of U.S.-born workers with less than a high school education—by 1.6% in California and by 1.7% in Texas. These effects were concentrated among men, with males without a high school education in California seeing an estimated relative wage decline of 2.9% due to immigration, and males without a high school education in Texas seeing an estimated relative wage decline of 1.8% due to immigration (while "less than high school" women gained 0.8% in California and lost 0.6% in Texas). Native workers without a high school education were essentially unaffected as a group in New York (relative decline of 0.1%), but there was a gender imbalance, with "less than high school" women gaining 1.7%, while "less than high school" men lost 1.3%. In Florida, workers with less than a high school education gained 1.2% due to immigration, but those gains were entirely among women, who saw a 2.9% relative increase in wages.

In sum, in these very high immigrant states, the overall relative effect of immigration is positive on native workers, around 0.7%, which is higher than the overall effect on native workers nationally, which was 0.4%. Thus, on average, native workers in these high immigrant states gain somewhat more than the national average due to immigration. However, some subgroups in these high immigrant states fare worse, as described above, particularly male workers with less than a high school degree. Research by Jeffrey Passel and D'Vera Cohn at the Pew Research Center (Passel et al. 2009) could perhaps shed some light on this finding. Their work shows that unauthorized immigrants make up a large portion of the


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**TABLE 11**

## Impact of immigration on wages from 1994 to 2007 in states by gender and education

| | U.S.-born | | | Foreign-born | | | All | | |
|---|---|---|---|---|---|---|---|---|---|
| | *All* | *Female* | *Male* | *All* | *Female* | *Male* | *All* | *Female* | *Male* |
| **United States** | | | | | | | | | |
| *Less than high school* | 0.3% | 1.1% | -0.2% | -3.7% | -2.5% | -4.4% | -0.7% | 0.3% | -1.4% |
| *High school* | 0.3 | 1.1 | -0.2 | -4.5 | -2.6 | -5.8 | 0.0 | 0.8 | -0.6 |
| *Some college* | 0.7 | 0.3 | 0.9 | -3.1 | -3.6 | -2.7 | 0.4 | 0.1 | 0.7 |
| *College* | 0.4 | 0.0 | 0.7 | -5.6 | -7.1 | -4.6 | -0.2 | -0.7 | 0.2 |
| *All* | 0.4 | 0.4 | 0.4 | -4.6 | -4.7 | -5.9 | 0.0 | 0.0 | 0.0 |
| **California** | | | | | | | | | |
| ***Less than high school*** | -1.6% | 0.8% | -2.9% | -1.9% | 0.9% | -3.6% | -1.8% | 0.9% | -3.4% |
| ***High school*** | -0.4 | 2.2 | -2.0 | -3.0 | 0.0 | -4.9 | -0.9 | 1.8 | -2.6 |
| ***Some college*** | 1.2 | 0.6 | 1.6 | -1.7 | -2.6 | -1.1 | 0.8 | 0.1 | 1.2 |
| ***College*** | 0.9 | 0.0 | 1.4 | -2.9 | -5.1 | -1.3 | 0.1 | -1.0 | 0.9 |
| ***All*** | 0.7 | 0.6 | 0.7 | -2.5 | -2.6 | -2.5 | 0.0 | 0.0 | 0.0 |
| **Florida** | | | | | | | | | |
| ***Less than high school*** | 1.2% | 2.9% | -0.4% | -1.0% | 2.0% | -2.5% | 0.6% | 2.6% | -1.0% |
| ***High school*** | 1.3 | 3.0 | -0.1 | -3.9 | -0.8 | -6.6 | 0.7 | 2.4 | -0.9 |
| ***Some college*** | 0.9 | 0.2 | 1.4 | -2.6 | -2.7 | -0.8 | 0.4 | -0.2 | 1.1 |
| ***College*** | 0.3 | -0.4 | 0.8 | -6.9 | -9.2 | -5.4 | -0.7 | -1.7 | -0.1 |
| ***All*** | 0.8 | 0.7 | 0.7 | -4.3 | -4.2 | -3.9 | 0.0 | 0.0 | 0.0 |
| **New York** | | | | | | | | | |
| ***Less than high school*** | -0.1% | 1.7% | -1.3% | -3.3% | -1.6% | -4.9% | -1.3% | 0.4% | -2.6% |
| ***High school*** | -0.1 | 1.5 | -1.5 | -3.7 | -1.0 | -5.7 | -0.7 | 1.1 | -2.2 |
| ***Some college*** | 1.2 | 0.6 | 1.7 | -1.6 | -2.3 | -0.8 | 0.9 | 0.3 | 1.4 |
| ***College*** | 0.8 | 0.2 | 1.4 | -3.9 | -6.2 | -2.3 | 0.1 | -0.7 | 0.8 |
| ***All*** | 0.6 | 0.6 | 0.6 | -3.4 | -3.6 | -3.3 | 0.0 | 0.0 | 0.0 |
| **Texas** | | | | | | | | | |
| ***Less than high school*** | -1.7% | -0.6% | -1.8% | -5.1% | -5.2% | -5.2% | -3.0% | -1.9% | -3.2% |
| ***High school*** | -1.6 | -0.6 | -1.7 | -11.6 | -9.2 | -12.8 | -2.0 | -1.1 | -2.2 |
| ***Some college*** | 1.6 | 1.2 | 1.7 | -3.8 | -5.9 | -5.0 | 1.4 | 1.0 | 1.4 |
| ***College*** | 1.3 | 0.9 | 1.5 | -4.1 | -6.7 | -3.0 | 0.8 | 0.2 | 1.1 |
| ***All*** | 0.5 | 0.6 | 0.6 | -5.4 | -6.7 | -5.0 | 0.0 | 0.0 | 0.0 |

**SOURCE:** EPI analysis of CPS data.

workforce in these four states relative to other states. They estimate that in the United States in 2008, unauthorized immigrants made up 5.4% of the labor force. However, they found that in California, for example, 9.9% of the workforce was an unauthorized immigrant, which was the largest percent of the workforce in any state except Nevada. Since, as shown in their work, unauthorized immigrants are more likely than other workers to be male and also more likely than other workers to be without a high school degree, a larger inflow of unauthorized immigrant workers, who are easily exploited by employers, may put downward pressure on the wages of similar native workers in these states, a pressure that is largely masked in estimates at the national level.


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## *The impact of immigration on wages in dollar terms*

This paper has presented results in terms of percentage relative wage gains or losses due to immigration. However, because there is a great deal of variation in average weekly wages for different subgroups, a similar percentage effect of immigration on wages may have very different effects by subgroup in terms of actual dollars gained or lost. (Table C2 in Appendix C gives the average weekly wages for 2007 for all of the subgroups in Table 11.) Based on average weekly wages in 1994, along with the relative wage effect of immigration in Table 11, Table 12 gives, in dollar terms, the relative effect of immigration from 1994 to 2007 on the average weekly wages in 2007.

**Table 12** shows that at the national level, the effect of immigration from 1994 to 2007 on wages of native

**TABLE 12**

**Dollar impact of immigration on wages from 1994 to 2007**

| | U.S.-born | | | Foreign-born | | | All | | |
|---|---|---|---|---|---|---|---|---|---|
| | *All* | *Female* | *Male* | *All* | *Female* | *Male* | *All* | *Female* | *Male* |
| **United States** | | | | | | | | | |
| *Less than high school* | $1.58 | $4.19 | -$1.37 | -$15.71 | -$8.78 | -$20.47 | -$3.48 | $0.93 | -$7.37 |
| *High school* | 2.16 | 5.87 | - 1.82 | - 26.13 | - 12.86 | - 37.98 | 0.07 | 4.26 | - 4.56 |
| *Some college* | 5.21 | 1.93 | 8.39 | - 23.25 | - 22.33 | - 23.18 | 3.33 | 0.37 | 6.25 |
| *College* | 4.46 | - 0.48 | 9.13 | - 64.46 | - 64.85 | - 60.03 | - 2.17 | - 6.34 | 2.23 |
| *All* | 3.68 | 2.78 | 4.32 | - 33.11 | - 28.53 | - 46.92 | 0.00 | 0.00 | 0.00 |
| **California** | | | | | | | | | |
| *Less than high school* | -$8.79 | $3.52 | -$18.52 | -$7.97 | $3.02 | -$16.43 | -$8.17 | $3.17 | -$16.89 |
| *High school* | - 3.03 | 13.32 | - 17.15 | - 16.21 | 0.20 | - 27.84 | - 6.51 | 10.19 | - 20.20 |
| *Some college* | 10.53 | 4.08 | 16.29 | - 12.91 | - 16.87 | - 9.26 | 6.85 | 1.00 | 12.07 |
| *College* | 11.96 | - 0.21 | 21.59 | - 33.82 | - 48.79 | - 16.95 | 1.90 | - 10.79 | 13.06 |
| *All* | 6.65 | 5.04 | 7.98 | - 16.74 | - 15.32 | - 17.83 | 0.00 | 0.00 | 0.00 |
| **Florida** | | | | | | | | | |
| *Less than high school* | $5.90 | $9.69 | -$2.13 | -$3.67 | $6.43 | -$9.61 | $2.63 | $8.66 | -$4.78 |
| *High school* | 8.15 | 14.54 | - 0.98 | - 19.51 | - 3.48 | - 37.92 | 3.92 | 11.62 | - 6.34 |
| *Some college* | 6.54 | 1.51 | 12.34 | - 19.54 | - 16.62 | - 7.00 | 2.68 | - 1.18 | 9.50 |
| *College* | 3.41 | - 4.00 | 11.35 | - 76.37 | - 83.40 | - 68.15 | - 8.56 | - 15.52 | - 0.88 |
| *All* | 6.12 | 4.81 | 6.46 | - 29.69 | - 24.27 | - 30.41 | 0.00 | 0.00 | 0.00 |
| **New York** | | | | | | | | | |
| *Less than high school* | -$0.53 | $7.12 | -$8.12 | -$15.24 | -$5.78 | -$26.25 | -$6.49 | $1.66 | -$15.27 |
| *High school* | - 1.07 | 8.45 | - 12.26 | - 24.23 | - 5.42 | - 42.81 | - 5.29 | 5.91 | - 17.84 |
| *Some college* | 9.70 | 4.13 | 16.13 | - 10.59 | - 13.61 | - 6.04 | 6.90 | 1.74 | 13.02 |
| *College* | 10.79 | 2.05 | 20.58 | - 45.57 | - 59.27 | - 30.06 | 1.56 | - 7.23 | 11.83 |
| *All* | 5.97 | 4.90 | 6.76 | - 26.54 | - 22.84 | - 29.07 | 0.00 | 0.00 | 0.00 |
| **Texas** | | | | | | | | | |
| *Less than high school* | -$7.46 | -$2.10 | -$9.42 | -$20.73 | -$15.27 | -$22.47 | -$13.02 | -$6.01 | -$15.61 |
| *High school* | - 9.60 | - 2.86 | - 12.48 | - 57.10 | - 44.63 | - 63.94 | - 12.46 | - 5.28 | - 15.69 |
| *Some college* | 12.33 | 7.34 | 14.89 | - 23.84 | - 29.66 | - 34.67 | 10.49 | 5.75 | 12.06 |
| *College* | 16.05 | 8.83 | 20.89 | - 45.60 | - 55.96 | - 37.55 | 9.80 | 1.91 | 14.58 |
| *All* | 4.39 | 3.43 | 5.34 | - 32.00 | - 34.17 | - 31.98 | 0.00 | 0.00 | 0.00 |

**SOURCE:** EPI analysis of CPS data.


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workers was modest—it raised the relative average weekly wage of native-born U.S. workers by $3.68. However, the impact varied somewhat across education category and gender. For workers without a high school education, immigration increased the weekly wages of women by $4.19 and reduced the weekly wages of men by $1.37. Earlier immigrants, on the other hand, experienced large declines due to new immigration. On average, immigration from 1994 to 2007 reduced the relative weekly wages of immigrants by $33.11.

For high immigration states, some of the effects on native workers were more dramatic. In California, male workers with less than a high school education saw a relative decline in weekly wages of $18.52 due to immigration, while in Florida, New York, and Texas, their losses were $2.13, $8.12, and $9.42, respectively. Female workers without a high school education in California, Florida, and New York saw increases of $3.52, $9.69, and $7.12, respectively, while they experienced declines of $2.10 in Texas.

## Conclusion

The methodology used in this paper follows the latest developments in the "national approach" to analyzing the effect of immigration on wages. In contrast to the "area approach," the national approach has traditionally found relatively large negative effects of immigration on the wages of native workers, especially native workers with low levels of education. However, when recent developments in the national-approach methodology are incorporated, the results are very similar to those found in the area approach—that recent immigration has had little effect on the relative wages of native workers, including workers with low levels of education. A key finding in the results is that the workers who stand to lose the most from new immigration are those workers most substitutable for new immigrants, namely earlier immigrants.

To those unfamiliar with the scholarly literature on the effect of immigration on native labor market outcomes, the findings of little relative impact on native wages may come as a surprise. The immigrant share of total hours worked rose from 9.9% in 1993 to 15.8% in 2007. How is it possible that economists have been unable to find more evidence of adverse effects on native workers?

An important thing to keep in mind is that the labor force is growing all the time. All else equal, more people, including more foreigners, do not mean lower wages or higher unemployment. If they did, every time a baby was born or a new graduate entered the labor force, they would hurt existing workers. But new workers do not just have supply-side impacts, they also affect demand. Those new graduates buy food and cars and pay rent. In other words, while new workers add to the supply of labor, they also consume goods and services, creating more jobs. An economy with more people does not mean lower wages and higher unemployment, it is simply a bigger economy. Just because New York is bigger than Los Angeles does not in and of itself mean workers in New York are worse off than workers in Los Angeles.

However, a large influx of a particular type of worker has the potential to have a negative impact on the wages of existing workers who are also of that type; workers who are highly substitutable for new immigrants stand to lose when there is a large influx of new immigrants. The immigrant share of total hours worked by workers with less than a high school education rose from 28.4% in 1993 to 47.5% in 2007. How is it that this has not caused large negative effects on native-born workers with less than a high school education?

There are two factors that largely shelter native-born workers with less than a high school education from these negative impacts. The first is their relatively high degree of substitutability with workers with a high school education. While these two types of workers are likely not perfect substitutes, the fact that their substitutability is relatively high means that the impact of an influx of less-than-high-school immigrants is not shouldered entirely by the 9.9% of the U.S. workforce that has less than a high school degree, but that it is to some extent diffused across the much larger share of the workforce—38.7% in 2007—that has a high school degree or less. This greatly reduces the impact on the least-educated American workers.

The other key factor is that even when considering workers within the same education/experience "class," native-born workers and immigrants are not perfect substitutes. In other words, substituting immigrant workers for native workers who have the same level of education and experience is possible, but limited due to the different


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characteristics of these two types of workers, including fluency in English. The workers who are the most substitutable for new immigrants are earlier immigrants, so this is the group that ends up shouldering much of the impact of new immigration, rather than native-born workers. Native-born workers in a given education/experience "class," on the other hand, can in fact be helped by immigration, if, for example, their language advantage means they are more likely to be given a supervisory role when there is a large influx of immigrants with their same general level of education and experience.

There are a few limitations of the research presented in this paper that are important to mention. First, this analysis looks at the effect of immigration on wages, not on employment. However, the limited effect we find of immigration on native wages suggests there is also likely a limited effect on native employment. Second, the approach used here does not allow for a separate estimation of the effect of immigration on different racial and ethnic subgroups by education level. While the empirical challenges are nontrivial, further research into the effect of immigration on non-Hispanic black U.S.-born workers by educational attainment is warranted. Third, we are only able to look at the relative effect on native wages of increases in *foreign-born* workers. Foreign-born workers may be naturalized U.S. citizens, permanent residents, temporary visa-holders, refugees, or undocumented workers. If a foreign-born worker is not a naturalized citizen, it is impossible to determine with our data whether he or she is a permanent resident, temporary visa-holder, refugee, or undocumented worker. This unfortunately limits the policy-relevance of the research presented here, since we are unable to determine the effect of various subgroups of foreign-born workers on native labor market outcomes. Better data are needed to further investigate the effect of different types of foreign-born workers, in particular unauthorized immigrants and temporary visa holders.

Finally, this paper estimates the long-run effect of immigration on wages, assuming the economy has fully adjusted to absorb new immigrants and that the overall real wage effect of immigration is zero. It is important to note that, since it takes time for capital to adjust to increases in the labor force, a large unexpected increase in the labor force will likely depress wages temporarily, something not accounted for here. Ottaviano and Peri (2008) find, for example, a 0.3% long-run relative wage increase of workers with less than a high school education due to immigration from 1990-2006, but a 0.7% short-run relative wage decrease. To give an idea of the speed of the effect of capital adjustment, they find that after five years, about 40% of the distance between the short-run effects and long-run effects has been eliminated, with the medium-term effect of immigration from 1990-2006 on the wages of workers with less than a high school degree being a decrease of 0.4%.

Except perhaps for male U.S.-born workers with no high school degree in California (where we find immigration from 1994-2007 has led to a 2.9% relative real wage decline), we find little evidence that recent immigration has had sizeable adverse effects on the wages of U.S.-born workers. Instead, it has generally had modest positive effects. Declining job quality for the least-educated American workers is due to a host of factors aside from immigration, including declining unionization rates, the eroding real value of the minimum wage, and trade practices that expose U.S. workers with low levels of education to competition from much lower wage workers around the globe. While it remains crucial to reform our broken immigration system, a larger economic agenda that will spur growth, reduce economic insecurity, and provide broadly shared prosperity is more central to improving their economic status.

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## Appendix A: Data

The data used are from the March supplement to the Current Population Survey, which asks detailed demographic and labor market questions about the previous year. We are using March supplement data because with these data we can compute the total hours worked in a year for each worker, which offers the most comprehensive measure of labor supply.

Note that these data do not distinguish between documented and undocumented immigrants; survey respondents are not questioned about their legal status. While undocumented immigrants are included in the survey sample, it is widely considered likely that there is higher survey non-response among undocumented immigrants than among others in the sample. In any event, we are unable to distinguish between the effects of documented and undocumented immigrant flows on native workers.

Following standard practice, we restrict the sample in the following way: 1) we restrict to workers who are at least 18 years old; 2) we define "potential labor market experience" as age minus 17 for workers without a high school degree, age minus 19 for workers with exactly a high school degree, age minus 21 for workers with some college training but no college degree, and age minus 23 for workers with a college degree or more, and restrict the sample to workers with between one and 40 years of potential experience; and 3) we define annual hours worked as weeks worked in a year times hours worked per week and drop people who have zero annual hours. When calculating average weekly wages, we further restrict the sample to people who report positive annual wage and salary income. To compute average weekly wages, we divide annual wage and salary income by weeks worked in a year, and calculate a mean weighted by the CPS person weight times annual hours (in order to properly account for varying hours worked across workers).

To ensure that the sample sizes are large enough in each cell for our estimations of the effect of immigration on wages, we pool 1993 and 1994 data for a "year 1994" sample, and pool 2006 and 2007 data for a "year 2007" sample. For the section that conducts the impact analysis separately by time period (1994-2000, 2000-03, and 2003-07), we additionally pool 1999 and 2000 together for "year 2000" data and pool 2002 and 2003 together for "year 2003" data.


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## Appendix B: Methodology

We compute the effect of immigration on wages using an approach outlined in Ottaviano and Peri (2008), in which they simulate the impact of immigration on wages based on a production function structure which combines workers of different education and experience levels. There are two main education groups, "high school or less" and "more than high school." There are two education subgroups within each main education group, "less than high school," "exactly high school," "some college," and "college or more." There are eight experience groups, 1-5 years, 6-10 years, 11-15 years, 16-20 years, 21-25 years, 26-30 years, 31-35 years, and 36-40 years.

Let $w_{Dbkjt}$ be the average weekly wage of native workers in main education group *b*, education subgroup *k*, experience group *j*, at time *t*, and similarly, let $w_{Fbkjt}$ be the average weekly wage of immigrant workers in main education group *b*, education subgroup *k*, experience group *j*, at time *t*. Let $F_{bkjt}$ be the total hours worked by immigrants in main education group *b*, education subgroup *k*, experience group *j*, at time *t*, and $\Delta F_{bkjt}$ be the change between the two periods in total hours worked by immigrants in main education group *b*, education subgroup *k*, and experience group *j*. Let $s_{Fbkjt}$ be the share of total wages (both immigrant and native) in year *t* paid to immigrant workers in main education group *b*, education subgroup *k*, and experience group *j*. Let $s_{bkjt}$ be the share of total wages in year *t* paid to workers in main education group *b*, education subgroup *k*, and experience group *j*. The elasticity of substitution between the two main education groups is given by $\sigma_{HL}$, the elasticity of substitution between two education subgroups is given by $\sigma_{bb}$, the elasticity of substitution between workers within the same education subgroup with different experience levels is given by $\sigma_{EXP}$, and the elasticity of substitution between immigrants and natives within the same education/experience group is given by $\sigma_{immi}$.

The percentage change in the wages of native worker with education level *k* and experience level *j* due to immigration is given by equation (25) in Ottaviano and Peri (2008). Assuming long run effects (i.e., ignoring the term that accounts for capital adjustment), it is

$$\left(\frac{\Delta\omega_{Dbkjt}}{\omega_{Dbkjt}}\right)^{Total} = \frac{1}{\sigma_{HL}}\sum_{c\in B}\sum_{q\in E}\sum_{i=1}^{8}\left(s_{Fcqit}\frac{\Delta F_{cqit}}{F_{cqit}}\right) + \left(\frac{1}{\sigma_{bb}} - \frac{1}{\sigma_{HL}}\right)\left(\frac{1}{s_{bt}}\right)\sum_{q\in k}\sum_{i=1}^{8}\left(s_{Fbqit}\frac{\Delta F_{bqit}}{F_{bqit}}\right)$$
$$+\left(\frac{1}{\sigma_{EXP}} - \frac{1}{\sigma_{bb}}\right)\left(\frac{1}{s_{bkt}}\right)\sum_{i=1}^{8}\left(s_{Fbkit}\frac{\Delta F_{bkit}}{F_{bkit}}\right) + \left(\frac{1}{\sigma_{immi}} - \frac{1}{\sigma_{EXP}}\right)\left(\frac{1}{s_{bkjt}}\right)\left(s_{Fbkjt}\frac{\Delta F_{bkjt}}{F_{bkjt}}\right)$$

Similarly, the percentage change in the wages of immigrant worker with education level *k* and experience level *j* due to immigration, assuming long run effects, is given by

$$\left(\frac{\Delta\omega_{Fbkjt}}{\omega_{Fbkjt}}\right)^{Total} = \frac{1}{\sigma_{HL}}\sum_{c\in B}\sum_{q\in E}\sum_{i=1}^{8}\left(s_{Fcqit}\frac{\Delta F_{cqit}}{F_{cqit}}\right) + \left(\frac{1}{\sigma_{bb}} - \frac{1}{\sigma_{HL}}\right)\left(\frac{1}{s_{bt}}\right)\sum_{q\in k}\sum_{i=1}^{8}\left(s_{Fbqit}\frac{\Delta F_{bqit}}{F_{bqit}}\right)$$
$$+\left(\frac{1}{\sigma_{EXP}} - \frac{1}{\sigma_{bb}}\right)\left(\frac{1}{s_{bkt}}\right)\sum_{i=1}^{8}\left(s_{Fbkit}\frac{\Delta F_{bkit}}{F_{bkit}}\right) + \left(\frac{1}{\sigma_{immi}} - \frac{1}{\sigma_{EXP}}\right)\left(\frac{1}{s_{bkjt}}\right)\left(s_{Fbkjt}\frac{\Delta F_{bkjt}}{F_{bkjt}}\right) - \frac{1}{\sigma_{immi}}\frac{\Delta F_{bkjt}}{F_{bkjt}}$$

All of the wage and hours terms in the above equations are calculated using CPS data as described in Appendix A. The different sets of elasticities we use, presented in **Table B1**, are taken from the literature (see Ottaviano and Peri (2008) and Card (2009) for detailed discussions). These elasticities of substitution are generally estimated by regressing the relative wage between two groups on their relative labor supply, exploiting variation over time and (where applicable) between education and/or experience categories. The intuition behind this methodology is the following: if an increase in the labor supply of group A relative to group B leads to very little decline in the wage of group A relative to group B, then the two groups are highly substitutable, and the elasticity of substitution between them is high. Conversely, if an


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increase in the labor supply of group A relative to group B leads to a large decline in the wage of group A relative to group B, then the two groups are not good substitutes, and the elasticity of substitution between them is low.

Using the percentage wage changes due to immigration in each education/experience group identified above, we aggregate to various levels (education, education by four experience groups, and overall) using sums weighted by the share of total wages in each group, as outlined in Appendix A of Ottaviano and Peri (2008). For the aggregations by race, we weight using wage shares by race.

To compute breakdowns of wage impacts by gender, we use the elasticities in **Table B1** but calculate all other components separately by gender. Finally, to compute breakdowns of wage impacts for the four high-immigration states, we use the elasticities in Table B1 but calculate all other components separately by state.

**TABLE B1**

**Elasticities**

| | *Low* | *High* | *Typical* | *Table 3* |
|---|---|---|---|---|
| $\sigma_{HL}$ | 1.4 | 2 | 2 | 2 |
| $\sigma_{HH}$ | 10 | 10 | 10 | 2 |
| $\sigma_{LL}$ | 10 | 50 | 20 | 2 |
| $\sigma_{EXP}$ | 3.3 | 10 | 5 | 5 |
| $\sigma_{immi}$ | 30 | 15 | 20 | $\infty$ |


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# Appendix C

**TABLE C1**

## Immigration by state

| State | Immigrant share of workers, 1993 | Immigrant share of workers, 2007 | Increase in number of immigrant workers (thousands) |
|---|---|---|---|
| *California* | 28.9% | 34.7% | 1668.4 |
| *Texas* | 12.0 | 20.0 | 1088.0 |
| *Florida* | 17.5 | 23.6 | 823.5 |
| *New York* | 18.3 | 26.6 | 811.1 |
| *New Jersey* | 17.4 | 27.7 | 448.4 |
| *Georgia* | 5.8 | 13.2 | 400.9 |
| *Illinois* | 11.8 | 16.6 | 352.8 |
| *Virginia* | 7.6 | 16.2 | 349.0 |
| *Maryland* | 7.6 | 19.7 | 325.7 |
| *Arizona* | 11.4 | 18.2 | 294.6 |
| *North Carolina* | 2.7 | 8.0 | 248.5 |
| *Nevada* | 11.2 | 24.9 | 216.9 |
| *Washington* | 7.4 | 12.7 | 212.4 |
| *Colorado* | 4.1 | 10.9 | 198.1 |
| *Massachusetts* | 11.9 | 18.0 | 179.1 |
| *Ohio* | 1.7 | 4.7 | 159.5 |
| *Pennsylvania* | 3.5 | 6.1 | 155.1 |
| *Oregon* | 5.7 | 13.1 | 151.1 |
| *Tennessee* | 1.2 | 6.3 | 141.9 |
| *Minnesota* | 3.5 | 7.9 | 124.6 |
| *Utah* | 3.4 | 12.2 | 116.5 |
| *Michigan* | 4.3 | 6.7 | 114.4 |
| *Wisconsin* | 1.6 | 5.2 | 100.9 |
| *Alabama* | 1.0 | 6.1 | 94.4 |
| *South Carolina* | 1.1 | 5.3 | 85.8 |
| *Indiana* | 1.7 | 4.2 | 72.4 |
| *Iowa* | 2.2% | 6.7% | 69.0 |
| *Missouri* | 2.0 | 4.1 | 63.0 |
| *Kentucky* | 0.4 | 3.7 | 60.4 |
| *Kansas* | 2.8 | 7.1 | 58.3 |
| *Arkansas* | 1.1 | 5.4 | 56.9 |
| *Louisiana* | 2.7 | 5.4 | 50.7 |
| *New Mexico* | 6.7 | 10.6 | 44.1 |
| *Nebraska* | 2.2 | 6.7 | 42.5 |
| *Connecticut* | 11.9 | 13.5 | 39.5 |
| *Mississippi* | 1.0 | 3.6 | 32.1 |
| *Delaware* | 3.6 | 10.6 | 28.8 |
| *Idaho* | 4.3 | 7.4 | 26.0 |
| *Hawaii* | 17.9 | 20.0 | 24.4 |
| *New Hampshire* | 4.0 | 6.4 | 21.8 |
| *Rhode Island* | 13.0 | 15.6 | 17.8 |
| *Oklahoma* | 4.7 | 5.1 | 9.5 |
| *Washington, D.C.* | 15.6 | 17.4 | 8.9 |
| *Alaska* | 5.2 | 6.8 | 7.7 |
| *South Dakota* | 2.2 | 3.4 | 5.9 |
| *Montana* | 0.7 | 1.7 | 4.6 |
| *Wyoming* | 1.5 | 2.7 | 3.3 |
| *West Virginia* | 0.7 | 1.1 | 3.0 |
| *Maine* | 2.5 | 2.8 | 2.4 |
| *North Dakota* | 2.0 | 2.6 | 2.3 |
| *Vermont* | 3.4 | 3.3 | -0.4 |

**SOURCE:** EPI analysis of CPS data.


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**TABLE C2**

## Average weekly wages in 2007

| | U.S. Born | | | Foreign-born | | | All | | |
|---|---|---|---|---|---|---|---|---|---|
| | *All* | *Female* | *Male* | *All* | *Female* | *Male* | *All* | *Female* | *Male* |
| **United States** | | | | | | | | | |
| *Less than high school* | $535.13 | $399.28 | $611.55 | $467.95 | $374.57 | $504.78 | $502.91 | $388.90 | $557.30 |
| *High school* | 731.55 | 571.05 | 842.30 | 618.26 | 509.37 | 682.68 | 716.05 | 563.27 | 819.30 |
| *Some college* | 855.71 | 704.74 | 991.53 | 779.78 | 662.28 | 877.93 | 848.60 | 700.90 | 980.55 |
| *College* | 1,504.79 | 1,145.65 | 1,808.55 | 1,470.66 | 1,116.21 | 1,723.81 | 1,499.76 | 1,141.65 | 1,795.25 |
| *All* | 1,027.82 | 813.88 | 1,197.82 | 876.53 | 727.29 | 966.43 | 1,003.79 | 801.92 | 1,157.42 |
| **California** | | | | | | | | | |
| *Less than high school* | $608.63 | $456.01 | $689.53 | $476.82 | $367.60 | $520.40 | $504.19 | $388.94 | $553.09 |
| *High school* | 825.34 | 680.72 | 917.60 | 624.09 | 514.12 | 683.11 | 752.92 | 624.89 | 829.75 |
| *Some college* | 973.23 | 812.29 | 1,115.81 | 824.04 | 757.80 | 877.21 | 940.68 | 800.89 | 1,061.90 |
| *College* | 1,778.79 | 1,419.41 | 2,070.12 | 1,480.83 | 1,142.27 | 1,776.26 | 1,696.29 | 1,340.44 | 1,990.72 |
| *All* | 1,249.24 | 1,024.24 | 1,424.59 | 852.66 | 746.41 | 917.22 | 1,109.17 | 935.25 | 1,233.46 |
| **Florida** | | | | | | | | | |
| *Less than high school* | $535.44 | $428.11 | $587.48 | $429.83 | $350.65 | $461.71 | $485.21 | $393.74 | $525.87 |
| *High school* | 722.08 | 596.43 | 813.38 | 579.06 | 488.16 | 644.18 | 688.31 | 571.03 | 773.25 |
| *Some college* | 864.52 | 688.55 | 1,021.50 | 723.96 | 600.26 | 852.17 | 839.98 | 672.13 | 993.68 |
| *College* | 1,452.34 | 1,118.03 | 1,748.19 | 1,335.11 | 980.61 | 1,628.22 | 1,426.65 | 1,088.77 | 1,721.26 |
| *All* | 1,003.39 | 804.87 | 1,164.55 | 824.57 | 666.62 | 942.45 | 961.99 | 774.01 | 1,111.66 |
| **New York** | | | | | | | | | |
| *Less than high school* | $508.36 | $361.84 | $581.36 | $464.47 | $395.51 | $501.85 | $484.21 | $380.82 | $538.19 |
| *High school* | 770.97 | 605.27 | 882.88 | 674.37 | 540.81 | 757.25 | 741.78 | 586.49 | 844.03 |
| *Some college* | 887.24 | 767.26 | 996.39 | 847.35 | 726.20 | 951.06 | 879.55 | 759.55 | 987.44 |
| *College* | 1,645.04 | 1,219.04 | 2,065.09 | 1,346.21 | 1,095.30 | 1,551.38 | 1,571.27 | 1,190.70 | 1,929.63 |
| *All* | 1,143.58 | 912.28 | 1,337.84 | 898.57 | 762.45 | 994.48 | 1,075.58 | 873.61 | 1,237.19 |
| **Texas** | | | | | | | | | |
| *Less than high school* | $509.04 | $381.58 | $590.67 | $460.01 | $336.52 | $499.71 | $480.46 | $360.60 | $532.97 |
| *High school* | 708.50 | 544.29 | 820.87 | 560.35 | 428.97 | 642.44 | 686.70 | 528.10 | 793.80 |
| *Some college* | 834.46 | 706.75 | 950.34 | 748.77 | 588.04 | 848.97 | 827.61 | 698.98 | 940.96 |
| *College* | 1,478.70 | 1,112.44 | 1,780.94 | 1,434.92 | 1,059.65 | 1,696.07 | 1,471.99 | 1,105.00 | 1,767.11 |
| *All* | 976.43 | 772.73 | 1,137.70 | 747.75 | 608.71 | 816.04 | 932.46 | 748.01 | 1,066.16 |

**SOURCE:** EPI analysis of CPS data.


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## Endnotes

1. The finding that high school graduates and high school dropouts are close substitutes is a new historical phenomenon. It was not true in the first half of the 20th century, when there was, instead, a big divide in production between high school graduates and those without a high school degree. The historical evidence can be found in Chapter 8 of T*he Race between Education and Technology* (Goldin and Katz 2008).

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