

# Literature Review: Wage Change of US-Born Workers Due to Immigration

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## Introduction

Native-born Americans who are current and future labor force participants are interested in the correlation between their wages and an increase in the immigrant share. The continuous growth of the foreign-born proportion of workers in the United States has caused controversy in academia, politics and the media. Economists have compiled differing evidence concerning the impact of immigrant worker share increase on native wages. They argue that immigration has a positive, negative, or no effect on native wages.

## Partition by Adjusting and Arriving Status

Orrenius and Zavodny (2003) show the impact of immigrant status on native wages by occupation groups: professionals, service related, and manual laborers.

Orrenius and Zavodny (2003) use 1994-2000 data from the Current Population Survey and the Immigration and Naturalization Service (INS). Immigrant statuses are partitioned into adjusting status and newly arriving. Adjusting status have obtained legal resident status. The authors instrument for economic motives using immigrant spouses of natives. They ignore the possibility that immigrant spouses may enter the country with economic motives.

An increase in the degree of substitution between immigrants and natives decreases native wages because wage competition increases. Adjusted status are more substitutable for natives than newly arriving immigrants. Adjusted immigrants have gained more knowledge about the industry, culture and language due to longer time spent in the United States. Presented in Table 1, adjusting status impact all three occupation groups' wages more negatively than newly

arriving. Adjusted status impact on average native's wages by +2.3 percent. Newly arriving impact on average +6.9 percent.

A decrease in skill level increases substitution. There is lower cost of knowledge required. Only manual laborers' wages are negative as a response to immigrant inflow. Conversely, licensing and English proficiency required for professional jobs, lowers substitution. Immigrant professionals complement native professionals by introducing their skills and increasing capital stock; wages of native professionals increase. Adjusting status impact native professionals with a +6.0 percent wage effect. The wage effect for manual laborers decreases to -4.2 percent. Orrenius and Zavodny (2003) conclude that the degree of substitution varies across skill and assimilation levels causing variation in native wages.

## Education-Experience Group Integration

Borjas (2003) expands on the definition of skill groups as defined by Orrenius and Zavodny (2003) and measures the impact of immigration on native wages by education level and work experience. Borjas (2003) assumes perfect substitution among natives and immigrants and argues that immigration decreases native wages.

Borjas (2003) uses data from the 1960-1990 U.S. decennial Census and the 1998-2001 Current Population Surveys. Borjas (2003) instruments for low labor force participation of women using native men. He groups work experience into eight, 5-year intervals (between 1 and 40 years). He defines education groups as high school dropouts, high school graduates, some college and college graduates. Borjas (2003) assumes fixed capital stock and ignores the long-run capital adjustments that occur as a response to the continuous immigration influx.

Contrasting to Orrenius and Zavodny (2003), Borjas (2003) disregards the partitioning of immigrant status. Borjas (2003) defines an immigrant as a foreign-born and is non-citizen or naturalized citizen. He assumes that immigrant children will have same wage effect as immigrant adults, given the same education and experience group. Under Orrenius and Zavodny (2003)'s theory of cultural assimilation, the immigrant children's wage effect in Borjas (2003) would be more adverse than their older counterpart immigrants when entering the labor market.

To increase variation to Orrenius and Zavodny (2003)'s model, Borjas (2003)

nests experience within each education group in a CES production function. Borjas (2003) defines experience as the difference between the assumed age of labor market entry and the worker's age at time of survey. The age of labor market entry depends on the age correlated with the respective education group. Borjas (2003) ignores the difference in the return of education for workers who have skipped or retaken a year in their schooling. Borjas (2003) calculates an immigrant's "effective experience." He scales international work experience to equate the value in the U.S. labor market with the standard model of immigration assimilation [see Borjas 1985]. However, Borjas (2003) assigns the same value of "efficiency units" to both natives and immigrants. He ignores the differences in the return on education of American and international institutions.

Borjas (2003) concludes that wage depression varied across experience levels for most native workers. Presented in Table 2, wages decrease for all native workers by on average -3.2 percent. The wage effect is more adverse for natives in the top and bottom of the experience distribution due to the large influx of immigrants in the 1980's and 1990's. When contrasting High School graduates and College graduates, the results support evidence from Orrenius and Zavodny (2003) that the wage effect is more adverse as education level increases. The wage decreases on average from -2.6 percent to -4.9 percent.

## **Short and Long Run Capital Adjustments**

Ottaviano and Peri (2006) disagree with Borjas (2003)'s model. Ottaviano and Peri (2006) use the general equilibrium approach to remove Borjas (2003)'s assumptions to calculate the full effect of immigrants on natives' wages. Because immigration is continuous, Ottaviano and Peri (2006) account for yearly capital adjustments in the short run and long run. Due to "culture-specific skills" of immigrants, the authors assume imperfect substitution.

Ottaviano and Peri (2006) use data from the 1960-2000 U.S. decennial Census and the 2004 American Community Survey (ACS). They instrument for endogeneity of employment using changes in total employment or immigrant share. The share of legal immigrants is computed from the INS and ACS. Not all illegal immigrants may be documented in the INS. Likewise in Borjas (2003), Ottaviano and Peri (2006) define immigrants as foreign-born, assume years of experience based on education level, scale "effective experience" and nest experience levels within education groups in a CES production function. The

authors derive the short run wage effect of the 1990-2004 immigration period from averaged experience levels.

Presented in Table 3, differences between the short (average +0.7 percent) and long run (average +1.8 percent) wage effects validates the robustness of Ottaviano and Peri (2006) theory that capital adjustment cannot be neglected. Column 4 reports the short-run effects (average -3.5 percent) using Borjas (2003)'s assumptions of fixed capital and perfect substitution. Ottaviano and Peri (2006)'s wage impact estimates are on average less adverse than those reported in Borjas (2003). Increasing labor supply and capital offset the magnitude of the wage effect. Borjas (2003) accounts only for the increase in labor supply and calculates the partial effect of immigration.

Results of Ottaviano and Peri (2006) are consistent with Orrenius and Zavodny (2003). With the exception of native college graduates, natives become less substitutable as the education level increases. The more negative wage effect of -0.4 percent, +0.7, -5.2 percent on U.S. born college graduates in Columns 2,3 and 4 respectfully, can be attributed to neglecting the differences of the returns of education in American and international institutions mentioned in Borjas (2003).

## Area Approach- California

Contrary to Orrenius and Zavodny (2003), Borjas (2003) and Ottaviano and Peri (2006) that studied the wage change of US-born workers due to immigration at a national level, Peri (2010) studies the labor market in California using an area approach. National level data limits the variation of workers across skill groups and fails to fully absorb skill-specific productivity shocks. Consequently, Peri (2010) instruments for national level data using California data. California provides "the largest variation in the labor supplied by immigrants in the US states." He uses an "ethnic enclave" on Mexican and central American migrants to standardize skill-education distribution levels.

Peri (2010) uses data from the 1960-2000 IPUMS Census and the 2005 American Community Survey. A nested CES production function with experience-education groups are maintained similar to procedures of Borjas (2003) and Ottaviano and Peri (2006). Likewise, Peri (2010) defines immigrants as foreign-born. Peri (2010) extends his assumption from Ottaviano and Peri (2006) and adjusts capital in the long run. Peri (2010) ignores the immediate short run

effects of immigration.

Peri (2010) rejects Borjas (2003)'s theory of perfect substitution. Immigrants are imperfect substitutes to natives and do not inflict a significant "crowding out effect" on native employment. Immigrant skills, such as foreign language proficiency, are not identical to native skills and lead to occupation specialization. As mentioned in Orrenius and Zavodny (2003) and Ottanviano and Peri (2006), the complimentary of skills between natives and immigrants increases the demand for native workers within a specific skill group. The increase in demand compensates for the increased competition of native wages. However, Peri acknowledges that "efficient specialization" may also offset wage competition.

Peri (2010) concludes that on average there is no correlation between the inflow of immigrants and native's wages between immigrants and natives assuming imperfect substitution. Presented in Table 4, the average effect of imperfect substitution on wages of +1.2 percent is small but positive as predicted by Peri (2010). Consistent with Ottanviano and Peri (2006)'s comparison of Borjas (2003), native wages subjected to perfect substitution are more adverse than wages subjected to imperfect substitution. However, wage-competition effects are more concentrated towards other immigrants within the same education group rather than natives, assuming imperfect substitution. Peri (2010) shows an average -12.7 percent change on foreign-born workers.

## Conclusion

Because economists use different estimation techniques and different parameters to conduct their studies, they have compiled contradicting results. Economists argue that immigration has a positive, negative, or no effect on native's wages with differing magnitudes. Orrenius and Zavodny (2003) introduce the idea that the degree of substitutability between natives and immigrants influences the magnitude and direction of the wage effect. The authors argue that as substitutability increases, the native wage decreases. Low skill adjusted status immigrants impose the most negative impact. Borjas (2003) argues perfect substitutability among natives and immigrants and expands on Orrenius and Zavodny (2003)'s definition of skill. Borjas (2003) shows that native wages decrease due to immigration. Ottanviano and Peri (2006) disagree with Borjas (2003)'s model and adjust capital as a response to the increasing immigrant worker share. Ottanviano and Peri (2006) show that the native wage effect is

less adverse than in Borjas (2003)'s model of fixed capital. Contrasting Orrenius and Zavodny (2003), Borjas (2003) and Ottanviano and Peri (2006), Peri (2010) uses the area approach to show that there is no native wage effect due to immigration. Immigrant skills complement native skills and offsets wage competition. Instead, foreign- born workers within the same education group experience a negative wage effect. Because of the variability among economists' models, it is difficult to estimate the true wage effect of US born workers due to immigration.

## References

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Table 1: Wage Change of US-Born Workers Due to Immigration

Occupation	Adjusting Status	Newly Arriving
Professionals	.060	.128
Service Workers	.050	.092
Manual Laborers	-.042	-.012
<b>Average</b>	<b>.023</b>	<b>.069</b>

Orrenius and Zavodny (2003) calculate the estimated coefficients from of average natives' wages due to immigrant workers that arrived between 1994 and 2000. Immigration statuses are partitioned into newly arriving and adjusting status. Adjusting status have obtained legal resident status. Natives and immigrants are partitioned into three occupation groups: professionals, service workers, manual laborers.



Table 2: Wage Change of US-Born Workers Due to Immigration

Years of Experience	Education			
	High School dropouts	High School graduates	Some College	College graduates
1-5	-0.065	-0.021	0.004	0.035
6-10	-0.101	-0.027	0.001	-0.042
11-15	-0.128	-0.036	-0.009	-0.059
16-20	-0.136	-0.033	-0.011	-0.055
21-25	-0.108	-0.025	-0.008	-0.049
26-30	-0.087	-0.023	0.000	-0.049
31-35	-0.066	0.022	0.001	-0.050
36-40	-0.044	-0.013	0.008	-0.056
<b>Average</b>	<b>.089</b>	<b>-.026</b>	<b>.003</b>	<b>-.049</b>

Borjas (2003) estimates wage effects of immigrant workers that arrived between 1980 and 2000. He partitions skill groups into work experience and education. Work experience is the difference between labor market entry age and worker's age at the time of survey. Labor market entry age is correlated with education level: high school dropouts (17 years); high school graduates (19 years); some college (21 years); college graduates (23 years). Experience is distributed into eight, 5-year intervals from 1 to 40 years. Education group is defined by years of schooling: high school dropouts (<12 years); high school graduates (12 years); some college (13-15 years); college graduates (<16). The calculations assume fixed capital. Column 6 and Row 10 show the average impact of immigration on all workers.

Table 3: Percentage Changes in Real Wages due to Immigrants Inflow:1990-2004  
Short-run Effects, accounting for yearly capital adjustment

Parameters:	<b>Adjusted Capital</b> (Short-run)	<b>Adjusted Capital</b> (Long-Run)	<b>Fixed Capital</b> (Short-Run)
<b>% Real Wage Change of US-Born Workers due to Immigration</b>			
High School dropouts	-2.2%	-1.10%	-7.9%
High School graduates	1.3%	-2.4%	-2.6%
Some College	2.3%	3.4%	-1.2%
College graduates	-0.4%	0.7%	5.2%
<b>Average US-born</b>	<b>1.8%</b>	<b>0.7%</b>	<b>3.5%</b>

Ottaviano and Peri (2006) estimate wage effects of immigrant workers that arrived between 1990-2004. Wage changes for each education group is calculated by averaging wage change effects of each education-experience group using a nested CES production function. Columns 2 and 3 assume imperfect substitutability among natives and immigrants. Columns 2 and 3 adjust for the growth of capital in the short run (year 2004) and for the long run (year 2009) when the capital has fully adjusted as a response to immigration, respectively. Column 4 uses Borjas (2003)'s fixed capital and perfect substitution assumptions to calculate values.

Table 4: Implications of Substitution for National wages

Parameters:	Perfect Substitutability	Imperfect Substitutability
<b>% Real Wage Change of US-Born Workers due to Immigration</b>		
Less than High School	-1.4%	-0.9%
High School graduates	0.0%	-0.9%
Some College	0.7%	1.3%
College graduates	-0.2%	1.3%
<b>Average US-born</b>	<b>0.0%</b>	<b>1.2%</b>
<b>% Real Wage Change of Foreign Born Workers due to Immigration</b>		
Less than High School	-1.4%	-9.6%
High School graduates	-0.0%	-13.9%
Some College	0.7%	-8.5%
College graduates	-0.2%	-15.7%
<b>Average Foreign Born</b>	<b>0.0%</b>	<b>-12.7%</b>

Peri (2010) estimates native and foreign wage effects of immigrant workers that arrived between 1990 and 2005. Wage changes for each education group is calculated by averaging wage change effects of each education-experience group using a nested CES production function. Capital is adjusted to maintain constant returns to scale. The long run is assumed. Columns 2 and 4 use Borjas (2003)'s perfect substitution assumption. Columns 3 and 5 use Peri (2010)'s imperfect substitution assumption.