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Globalization and Investment in Human Capital

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Abstract

Workers are becoming increasingly concerned about the impact that globalization has on their domestic labor market. While existing research typically focuses on the effects on labor market outcomes such as wages and employment, we examine whether American workers respond to globalization by increasing their investment in human capital. Specifically, we measure the extent to which offshoring and immigration affect enrollment at institutions of higher education. The results indicate that both offshoring and immigration increase enrollment at community colleges, particularly among older students. We conclude that workers in the U.S. are responding to offshoring and immigration by acquiring the skills necessary to compete in a global economy.

Keywords: globalization, higher education, enrollment, offshoring, immigration

JEL Codes: F16, I2, J24

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Workers in the United States are increasingly competing in an integrated global labor market. This has led to considerable anxiety among workers and sparked substantial debate among politicians, the media, and the general public. This debate generally focuses on how globalization affects domestic wages and employment levels. However, relatively little is known about how globalization impacts investments in human capital. Are American workers responding to globalization by investing in the skills and knowledge that will allow them to succeed in an increasingly global economy? This paper uses a comprehensive dataset of U.S. higher education institutions to address this question.

Globalization, particularly in the forms of immigration and offshoring, increases the effective supply of low-skilled workers available to domestic firms.² American firms have a larger pool of low-skilled immigrant workers as well as an increased ability to shift production facilities to low-skilled labor abundant countries. As a result, labor market competition caused by globalization has predominantly affected low-skilled native workers. A natural response is for native workers to acquire the skills necessary in order to avoid direct competition with foreign workers. The extent to which American workers have responded to this increased competition by returning to school is the focus of this paper.

In this analysis, we measure investments in human capital using enrollment at institutions of higher education. While we expect that, in general, workers are responding rationally by increasing their level of human capital, it is likely that globalization will have a heterogeneous effect on enrollments at different types of institutions. In particular, globalization likely impacts community colleges more than four-year institutions. The marginal worker affected by globalization is likely to find the short,

²Offshoring refers to the relocation of domestic jobs to foreign countries. This includes movements of jobs within a firm or to another foreign firm.

have on older students (above 25 years old). We also find that the enrollments of White, Hispanic, and Asian students all increase by a similar amount in response to offshoring and immigration, while the enrollment of Black students remains relatively unchanged. These results indicate that American workers respond to increases in global competition by returning to school. Furthermore, these findings highlight the importance of community colleges in retraining native workers.

Numerous authors have studied the impact of globalization on domestic labor markets. For example, Feenstra and Hanson (1996, 1999) and Slaughter (2000) examine the effects that outsourcing and multinational activity have on the domestic wage distribution. Harrison and McMillan (2006) analyze changes in U.S. manufacturing employment resulting from changes in foreign affiliate wages. The impact of immigration on the domestic labor market has also been the focus of much research over the past few decades. Research by Card (1990, 2005) has generally shown a small effect on wages and employment of natives, while that of Borjas (2003) and Borjas et al. (1997) find a larger, more adverse, impact.

In general, research on the relationship between globalization and the domestic

Specifically, increases in enrollment may reduce the unemployment rate or increase wages. We view offshoring and immigration as an exogenous shock that allows us to identify the causal effect of these global forces on local enrollment.

petition with foreign workers by acquiring the training and knowledge that move them up the skill distribution. Thus, increases in offshoring and immigration will lead to native workers returning to school. While this is an intuitively appealing result, there is little empirical evidence supporting this hypothesis.

While we expect college enrollment to increase in response to offshoring and immigration, the impact may be larger at particular types of institutions. The enrollment response to offshoring and immigration is likely to be strongest at community college institutions for a number of reasons. First, workers displaced due to globalization will find the short time frame, the emphasis on technical skills, and the relatively low cost appealing at community colleges.⁵ The marginal worker affected by offshoring and immigration is unlikely to commit the time and money required to attend a four-year institution. The opportunity costs of attending a four-year institution for displaced workers are high. Kane and Rouse (1999), for example, discuss the fact that the availability of night and weekend courses, the low costs of attendance, and the neighborhood convenience of community colleges are particularly appealing for many students.

Second, community colleges have the capacity to accommodate new students who are displaced due to globalization. While many four-year institutions are constrained by the available housing options, community colleges generally do not face these

ment differences across various minority groups.⁶ Globalization may be another, relatively unexamined factor, affecting the educational investment decisions of particular racial groups. Therefore, we estimate how offshoring and immigration impact enrollments of students of different races. We are particularly interested in how enrollment responses of minority students compare to the enrollment responses of White students.

We are interested in how globalization affects investment in human capital. Thus, we estimate the impact of immigration and offshoring on enrollment using the following equation:

$$\text{Enroll}_{i;s;t} = \alpha + \beta_1 \text{Imm}_{s;t} + \beta_2 \text{Off}_{s;t} + \gamma_1 C_{i;t} + \gamma_2 L_{s;t} + \epsilon_{i;t} + \eta_{i;s;t}$$

The dependent variable, $\text{Enroll}_{i;s;t}$, represents the total undergraduate enrollment at higher education institution i located in state s in year t . The independent variables of interest are our measures of globalization. We use two separate measures, immigration and offshoring, to quantify the degree to which the area surrounding an institution is affected by global forces. These variables are both measured at the state level. One practical reason for this is that we are limited in our ability to construct

acceptance, financial aid, and tuition. Thus, most individuals who would be induced to return to school would consider the choice set to be in-state institutions.

Given that our globalization variables are measured at the state level, it may seem natural to aggregate our dependent variable, *Enroll*, to the same level. We do not proceed in this manner so that we can include institution-specific information such as tuition and financial aid in our analysis. The *C* matrix in the equation above represents these institutional level variables. We expect that an increase in tuition will reduce enrollment while an increase in financial aid will increase enrollment.

The standard errors in all regressions that follow are clustered at the state-year level. This corrects for any correlation in our standard errors that arises from the fact that our globalization variables are measured at the state-year level while our enrollment variables are at the institution-year level. Specifically, we are concerned that there may be some unobserved shock in state *s* in year *t* that may be affecting enrollment at all institutions in that state in a similar manner.

The *L* matrix includes variables measured at the state level that capture labor market conditions other than globalization. In order to isolate and identify the effects of globalization, we include both state unemployment and median income to account for general economic conditions. A higher unemployment rate, for example, is an indication of poor labor market conditions and thus will lead to an increase in enrollment. The fixed terms in our equation, α_i and β_t , represent institution and year fixed effects respectively.

Given our estimation strategy, one might be concerned about potential endogeneity bias associated with the immigration variable. However, non-economic factors such as family and friend networks, proximity to home country, and weather are typically found to be important determinants of immigrant location decisions.⁷ To the best of our knowledge, no studies have found that immigrants choose a destination

⁷See Bartel (1989), Hansen et al. (2002), and Cragg and Kahn (1997).

based on enrollment in community colleges. However, it may be possible that immigrants choose a location based on local wages and wages might be correlated with community college enrollment. Several features of our estimation strategy minimize these concerns. First, these issues are likely more troublesome for a city level analysis than a state level analysis like ours. Second, we include median income explicitly in our regressions. In the results that follow, the coefficient on the immigration variable is not sensitive to the inclusion of this control variable. Finally, we lag all independent variables one year. It is highly unlikely that immigration in the previous year depends on current community college enrollment.

We also lag our independent variables to account for the fact that individual enrollment decisions generally take place during the first half of any given year. As a result, it is more likely that current enrollment is impacted by the changes in offshoring and immigration from the previous year. In addition, when estimating this equation, both dependent and independent variables are transformed using the natural logarithm. This facilitates a more straightforward interpretation of the results. In particular, the log-log specification allows for more intuitive comparisons of the magnitude of estimated coefficients across heterogeneous groups.

The data on college enrollment, the dependent variable, come from the National Center for Education Statistics' Integrated Postsecondary Education Data System (IPEDS). This is a longitudinal dataset that provides information on the universe of higher education institutions in the United States. This includes not only universities, but also community colleges, vocational schools, and other types of institutions. For the purposes of this study we collected information on total undergraduate enrollment

by institution. In addition, IPEDS also provides data on average in-state tuition and average financial aid received by institution and enrollment by various institution and student characteristics. The enrollment data span the years 2000-2007 and the 48 contiguous states. We restrict the sample to institutions that reported information for all years, leaving us with a total of 3,475 institutions.

We quantify globalization at the state level using measures of offshoring and immigration. Immigration, the unemployment rate, and the median income are constructed using data from the 2000 1% sample of the U.S. Census, as well as the American Community Survey (ACS) from 2001 to 2006.⁸

by year and 60 industries. These foreign employees are then assigned to a state using each state's share of national GDP in these detailed industries. Within each state, we then aggregate across these 60 industries to create the estimated level of foreign affiliate employment for each state. Finally, we calculate the share of foreign affiliate employment to total employment, including both domestic and foreign employees. To summarize, the offshoring variable is constructed in the following manner:

$$\text{offshoring}_{st} = \frac{\sum_j \frac{\text{GDP}_{jst}}{\text{GDP}_{jst}} * \text{Foreign_Affiliate_Empl}_{jt}}{\text{Domestic_Empl}_{st} + \sum_j \frac{\text{GDP}_{jst}}{\text{GDP}_{jst}} * \text{Foreign_Affiliate_Empl}_{jt}} * 100$$

Table 1 displays the state average of total enrollment at institutions of higher education (2001-2007), as well as the state averages of the globalization variables (2000-2006). As discussed previously, immigration is measured as the share of the adult population that is foreign born and offshoring is measured as the share of foreign affiliate employees to total employment. Overall we see that both immigration and

even within the relatively short period examined in this analysis. We also see that undergraduate enrollment is increasing over this period at a relatively rapid rate (14.5 percent from 2000 to 2007). Whether any of this increase can be attributed to the increases in globalization is the focus of this analysis.

Overall, these descriptive statistics indicate that the enrollment and globalization measures vary substantially both across states and over time. This provides insight into the dimensions and characteristics of the dataset used in this analysis. However, the fixed effects in the empirical estimation strategy will account for most of these differences. The analysis that follows exploits state specific variation over time to examine how globalization affects enrollment at specific institutions. Thus, it is the changes to globalization that occur within states that are most relevant to our analysis.

Figure 2 presents the percentage changes from 2000 to 2006 for both measures of globalization. While our regression analysis will exploit changes from year to year, the long differences shown here are still useful for illustrating the general level of variation across states. The plot shows that states varied greatly in how their economies were impacted by globalization changes over the period. There are only a handful of states for which the immigration and offshoring measures declined, but there are a substantial number that experienced a decline in one measure and an increase in the other. The fact that the percentage changes in the two measures are not highly correlated ($r = 0.303$) indicates that we are able to separately identify the impacts of the two main aspects of globalization. While globalization has had an increasing impact on the U.S. labor market, this figure is an indication that this impact has not been felt equally across states. We next present the results indicating the extent to which the differential impacts on states has affected investment in higher education.

The basic empirical estimation strategy presented in Section 3 is used to test a variety of specifications. First, we examine the impact of globalization on enrollment by various institutional characteristics, including the highest degree offered and the location of the institution. Second, we investigate the impact of globalization on enrollments of different types of students, examining how enrollment responses differ by age and race.

We begin by examining the impact of globalization on all institutions that report total undergraduate enrollment, average tuition, and average financial aid. The results are presented in the first column of Table 3. As discussed in Section 3, both dependent and independent variables are in natural log form, so the coefficients are interpreted as elasticities. This means, for example, that a 10 percent increase in the foreign-born share of the population in a state leads to a 0.5 percent increase in enrollment at each higher education institution within that state. This result is significant at the 10 percent level. The offshoring coefficient is positive but insignificant. The coefficients on unemployment and tuition are significant and of the expected sign, while those

institutions, there are fewer Non-Degree institutions that report enrollment figures.¹⁰ The unemployment rate is the only factor that significantly contributes to fluctuations in enrollment at these institutions. Globalization does not significantly impact enrollment at Non-Degree institutions.

Column 3 presents results for community colleges that offer an Associate's degree and nothing higher. Here we see that both globalization measures are highly significant. A 10 percent increase in the foreign-born share of the population in a state leads to a 1.2 percent increase in enrollment at community colleges in the state, while a 10 percent increase in the share of jobs offshored leads to a 2.5 percent increase in community college enrollment. Again in this specification, coefficients for unemployment and tuition are significant and of the expected sign.

The final column of Table 3 presents the results for institutions that offer at least a Bachelor's degree. These coefficients indicate that globalization does not have a significant impact on enrollment at these institutions. However, unemployment and tuition are significant and have the expected sign.

Overall, Table 3 indicates that there is an increase in investment in human capital at institutions located in states most affected by globalization. Specifically, we see enrollment at community colleges increase in these states. This is consistent with the intuition discussed in Section 2. Workers who are displaced likely find the short time frame and the emphasis on technical skills appealing at community colleges; community colleges are less affected by capacity constraints; and less mobile community college students are more likely to respond to local economic conditions. Thus, for the rest of the analysis, we focus on enrollment at the community college level.

¹⁰Institutions that receive any federal financial aid support, such as Pell Grants, are required by the Higher Education Act of 1965 to respond to IPEDS surveys. There are a large number of "Non-Degree" institutions that do not receive such support.

It is possible that enrollment responses will differ by the level of urbanization in the area around the institution. At the community college level, in particular, it is common for individuals to attend schools not only in-state but also within their local area of residence. If this is the case, then it is likely that an increase in offshoring within a state should disproportionately increase enrollment at community colleges located in more urban areas. Increases in immigration, on the other hand, may impact enrollment in both urban and rural settings.

Table 4 presents the estimation results examining enrollment response by the

older individuals. We see that for recent high school graduates (18 to 21-year-olds) an

be explored further in future work.

As a robustness check, we include two additional measures of globalization to our baseline estimation strategy. We are concerned that immigration and offshoring may be capturing variation in other types of globalization that are not adequately controlled for. Specifically, we include the share of inshored workers and the share of workers displaced due to import competition.

Data on inshoring, defined as the number of employees of majority owned U.S. affiliates of foreign firms, is obtained from the BEA. It is more straightforward to attribute foreign activity to the state in which it is conducted than it is to attribute U.S. activity abroad to the state of origin. Thus, the BEA provides a direct measure of inshoring, but only for the years 2002-2006. For 2000 and 2001, we attribute inshoring across states in the same manner as offshoring. We expect that increases in inshoring will increase job prospects and thus decrease enrollment.

Data on the number of workers displaced due to import competition is obtained from the Trade Adjustment Assistance (TAA) program. Workers who lose their jobs due to import competition may apply to the TAA program for training, job search and relocation funds, income support and other reemployment benefits. We expect that an increase in the number of displaced workers due to import competition will increase enrollment.

Regressions including the share of workers displaced due to import competition and the share of inshoring are reported in Table 7. We see that the coefficients on immigration and offshoring have remained virtually identical to those reported in Table 3. Immigration and offshoring increase enrollment at community colleges and

have no effect on enrollment at other institutions. Including inshoring and import competition does not change this result. Furthermore, import competition, measured using data from the TAA, does not significantly impact enrollment at any type of institution. While inshoring has no impact on enrollment at Non-Degree and Associate granting institutions, it does have a slight negative effect on enrollment at four year institutions. This coefficient is of the expected sign, and indicates that inshoring increases the job prospects of people who would

the standard set of independent variables. The results in column 3 indicate that there are not significant increases in enrollment among non-resident aliens in response to increases in immigration. In contrast, column 2 shows that the estimated impact of immigration on community college enrollment is driven by changes in the enrollment of native residents. This provides further evidence that the positive coefficient on immigration indicates a response in the human capital investment decision of native residents.

Workers in the United States have become increasingly concerned about the impact globalization has on their domestic labor market. Recent research has focused on the effect globalization has on labor market outcomes such as wages and unemployment. We examine a dimension that has not yet been explored, the impact that globalization has on human capital investment decisions.

Using data on college enrollment, immigration, and offshoring we analyze whether states that are more exposed to globalization have seen differential changes in enrollment. The results indicate that both immigration and offshoring have a positive effect on enrollment. These enrollment responses are stronger among particular types of institutions and among particular groups of students. Globalization leads to increases in enrollment at community colleges, but not at other types of institutions. The results also indicate that offshoring increases community college enrollment in urban locations, while immigration increases community college enrollment in all types of locations. Finally, we find that older individuals are more likely to be impacted by globalization, and that Blacks are less affected.

These results indicate that individuals are reacting in a rational way to globalization. As the low-skilled labor force faces increasing competition due to immigra-

tion and offshoring, native workers are responding by increasing their human capital. These results raise questions about the need for the government to fund the retrain-

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TABLE 1
State Averages

State	Total Enrollment	Immigration	Offshoring
Alabama	258,459	3.7	4.5
Arizona	403,311	17.1	4.5
Arkansas	124,314	4.5	4.5
California	2,178,592	33.2	5.2
Colorado	250,861	11.0	4.3
Connecticut	145,757	16.2	5.5
Delaware	41,955	9.3	5.2
Florida	763,290	22.7	3.5
Georgia	358,053	10.3	5.0
Idaho	66,890	6.8	3.9
Illinois	660,796	14.6	5.2
Indiana	305,074	4.6	7.1
Iowa	193,532	3.8	5.1
Kansas	169,112	5.3	3.9
Kentucky	192,289	3.0	5.9
Louisiana	202,373	4.1	4.7
Maine	56,562	4.2	3.0
Maryland	255,251	13.3	3.8
Massachusetts	336,520	16.3	5.1
Michigan	524,241	6.6	7.9
Minnesota	276,238	6.2	4.4
Mississippi	131,551	2.2	3.7
Missouri	291,026	4.2	4.7
Montana	42,046	2.7	2.2
Nebraska	102,748	5.5	3.9
Nevada	90,750	20.9	3.4
New Hampshire	56,722	6.2	4.5
New Jersey	327,349	23.3	5.5
New Mexico	109,635	10.8	4.4
New York	937,327	23.9	4.8
North Carolina	408,290	8.0	5.9
North Dakota	42,504	2.9	3.2
Ohio	531,489	4.3	5.9
Oklahoma	188,559	5.8	3.9
Oregon	174,466	10.1	5.1
Pennsylvania	571,553	6.0	4.8
Rhode Island	70,764	14.3	4.0
South Carolina	183,321	5.4	4.8
South Dakota	41,260	2.7	3.5
Tennessee	245,256	4.5	5.4
Texas	1,050,796	18.4	5.2
Utah	171,457	8.7	3.6
Vermont	33,260	4.8	3.8
Virginia	361,326	12.1	4.6
Washington	312,097	13.6	4.0
West Virginia	80,851	1.7	3.7
Wisconsin	290,714	4.2	5.1
Wyoming	29,823	3.4	4.1

FIGURE 1

Offshoring and Immigration by State (2000-2006 Average)

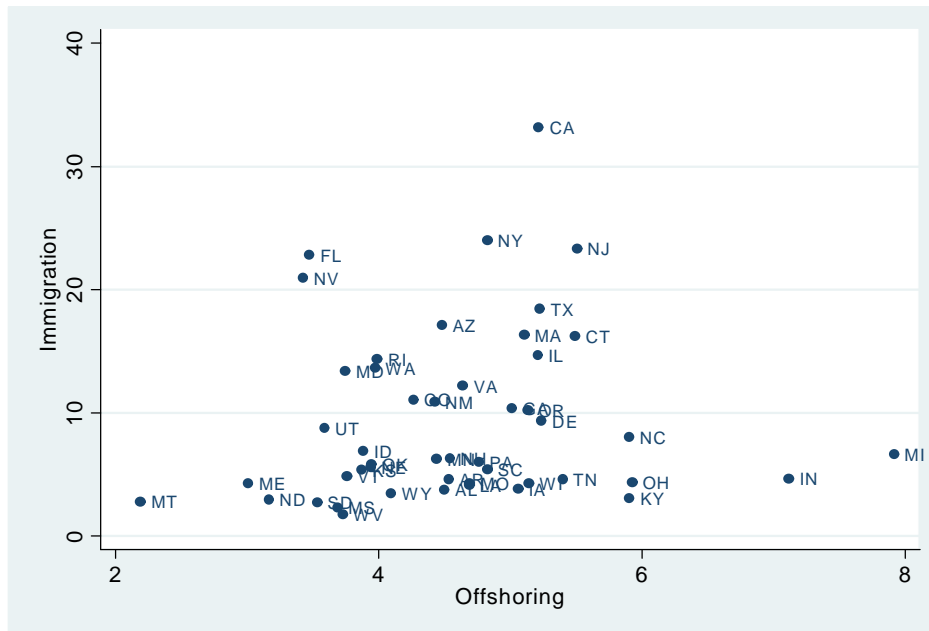


TABLE 2

Year Averages

Year	Enrollment	Immigration	Offshoring
2000	13,601,574	14.5	4.9
2001	13,823,976	12.5	4.8
2002	14,415,372	12.7	4.8
2003	14,610,108	13.2	4.8
2004	14,889,081	13.1	4.9
2005	15,005,920	14.5	5.1
2006	15,204,562	14.9	5.2
2007	15,572,636	-	-

FIGURE 2

Percentage Changes in Offshoring and Immigration by State (2000-2006)



	All Institutions	Non-Degree	Associate	Bachelor +
Immigration	0.048* [0.029]	0.092 [0.218]	0.120** [0.054]	0.001 [0.025]
Offshoring	0.059 [0.048]	-0.072 [0.356]	0.248*** [0.085]	-0.076 [0.048]
Unemployment	0.105*** [0.027]	0.365*** [0.156]	0.120** [0.047]	0.061** [0.027]
Income	0.007 [0.106]	-1.114 [0.690]	0.118 [0.201]	0.016 [0.095]
Tuition	-0.040* [0.021]	0.119 [0.098]	-0.058* [0.032]	-0.044** [0.021]
Aid	-0.002 [0.007]	-0.012 [0.024]	0.007 [0.012]	-0.001 [0.008]
Observations	24325	1724	9432	1316902131690

Community College Enrollment by Age

	Total	18 to 21	22 to 24	25 to 29	30 to 34	35 to 39	40 to 49	50 to 64
Immigration	0.120** [0.054]	0.081* [0.046]	0.032 [0.065]	0.080 [0.067]	0.259*** [0.068]	0.274*** [0.074]	0.400*** [0.080]	0.368*** [0.102]
Offshoring	0.248*** [0.085]	-0.089 [0.075]	0.020 [0.108]	0.281*** [0.104]	0.427*** [0.119]	0.295*** [0.124]	0.163 [0.117]	0.006 [0.192]
Unemployment	0.120** [0.047]	0.041 [0.051]	0.052 [0.056]	0.014 [0.052]	0.108* [0.060]	0.201*** [0.064]	0.184*** [0.067]	0.230*** [0.078]
Income	0.118 [0.201]	0.416** [0.197]	0.086 [0.261]	0.132 [0.253]	-0.139 [0.299]	-0.189 [0.304]	-0.163 [0.311]	-0.134 [0.453]
Tuition	-0.058* [0.032]	-0.040* [0.024]	-0.062* [0.036]	-0.061 [0.038]	-0.091* [0.047]	-0.063 [0.046]	-0.077 [0.053]	-0.128* [0.075]
Aid	0.007 [0.012]	0.017 [0.012]	0.019 [0.016]	0.006 [0.014]	0.008 [0.016]	0.018 [0.016]	0.017 [0.020]	0.015 [0.021]
Observations	9432	8485	8521	8495	8459	8424	8426	8231
R-squared	0.99	0.98	0.98	0.98	0.97	0.97	0.97	0.96

Standard errors clustered at the state*year level in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions include institution and year fixed effects. All variables are in ln form and the independent variables have been lagged one year.

	Total	White	Black	Hispanic	Asian
Immigration	0.120** [0.054]	0.200** [0.077]	0.043 [0.107]	0.286*** [0.091]	0.199* [0.107]

	All Institutions	Non-Degree	Associate	Bachelor +
Immigration	0.048 [0.029]	0.139 [0.226]	0.116** [0.054]	0.002 [0.024]
Offshoring	0.059 [0.048]	-0.101 [0.356]	0.242*** [0.085]	-0.075 [0.046]
Import Competition	0.000 [0.003]	-0.042 [0.032]	-0.003 [0.005]	0.003 [0.003]
Inshoring	-0.002 [0.018]	0.199 [0.161]	0.037 [0.036]	-0.046*** [0.016]
Unemployment	0.105*** [0.027]	0.406** [0.169]	0.117** [0.047]	0.065** [0.026]
Income	0.009 [0.106]	-1.455** [0.655]	0.110 [0.202]	0.041 [0.092]

02-057*0

	Total	Native	Non-Resident Alien
Immigration	0.120** [0.054]	0.116** [0.053]	0.082 [0.130]
Offshoring	0.248*** [0.085]	0.254*** [0.084]	-0.330 [0.225]
Unemployment	0.120** [0.047]	0.124*** [0.047]	-0.132 [0.106]
Income	0.118 [0.201]	0.126 [0.200]	0.566 [0.551]
Tuition	-0.058* [0.032]	-0.058* [0.032]	-0.084* [0.049]
Aid	0.007 [0.012]	0.007 [0.012]	0.002 [0.025]
Observations	9432	9432	9432
R-squared	0.99	0.99	0.92

Standard errors clustered at the state*year level in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.