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Globalization and Investment in Human Capital

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Abstract

The authors examine the impact of globalization on the domestic labor market for low-skilled workers. Whereas existing research typically focuses on the effects on labor market outcomes such as wages and employment, the authors of this paper examine whether American workers respond to globalization by increasing their investment in human capital. Using both Census data and the Integrated Postsecondary Education Data System (IPEDS) for the period 2000–2007, they measure the extent to which offshoring and immigration affect enrollment at institutions of higher education. Results indicate that both offshoring and immigration increase enrollment at community colleges but not at other types of institutions, particularly among older, non-traditional age students. The authors conclude that U.S. workers are indeed responding to globalization by acquiring the skills necessary to compete in a global economy.

GLOBALIZATION AND INVESTMENT IN HUMAN CAPITAL

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The authors examine the impact of globalization on the domestic labor market for low-skilled workers. Whereas existing research typically focuses on the effects on labor market outcomes such as wages and employment, the authors of this paper examine whether American workers respond to globalization by increasing their investment in human capital. Using both Census data and the Integrated Postsecondary Education Data System (IPEDS) for the period 2000–2007, they measure the extent to which offshoring and immigration affect enrollment at institutions of higher education. Results indicate that both offshoring and immigration increase enrollment at community colleges but not other types of institutions, particularly among older, non-traditional age students. The authors conclude that U.S. workers are indeed responding to globalization by acquiring the skills necessary to compete in a global economy.

Workers in the United States are increasingly competing in an integrated global labor market. This has not only led to considerable anxiety among workers, but has also sparked substantial debate among politicians, the media, and the general public. The debate, however, has generally focused on how globalization affects domestic wages and employment levels. Relatively little is known about the extent to which globalization affects investments in human capital. Are American workers responding to it by investing in the skills and knowledge that will allow them to succeed in an increasingly global economy? In this study, we use a comprehensive dataset of U.S. higher education institutions to address this question.

Particularly in the forms of immigration and offshoring, globalization increases the effective supply of low-skilled workers available to domestic firms.[1] American firms have access to 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 (U.S.-born) workers. A natural reaction to this situation 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 our study.

In this analysis, we measure investments in human capital using enrollment at institutions of higher education. We construct measures of immigration and offshoring to determine how the levels of these two essen-

[1] Offshoring refers to the relocation of domestic jobs to foreign countries, including movements of jobs within a firm or to another foreign firm.

tial components of globalization differ across U.S. states. These measures are then used to examine whether the states that have experienced greater exposure to globalization have had corresponding increases in enrollment at their higher education institutions, and whether globalization has a heterogeneous effect on enrollments at different types of institutions and among different types of students.

Literature Review

Numerous authors have studied the impact of globalization on domestic labor markets. For example, Feenstra and Hanson (1996, 1999) and Slaughter (2000) examined the effects of outsourcing and multinational activity on the domestic wage distribution. Harrison and McMillan (2006) analyzed 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, whereas that of Borjas (2003) and Borjas et al. (1997) found a larger, more adverse, impact.

Research on the relationship between globalization and the domestic labor market focuses generally on the implications of global forces on wages or employment. We consider instead a more long-term implication of globalization by examining how offshoring and immigration affect the domestic worker's human capital investment decision. This particular aspect of the relationship has been explored theoretically by both Findlay and Kierzkowski (1983) and Chesnokova and Krishna (2009), yet it remains relatively unexamined empirically. Given the fundamental role this may play in how the domestic labor market and economy ultimately adjust to increased globalization, we attempt to identify the magnitude of such a relationship.

Our investigation contributes to the literature that examines how enrollments in higher education institutions respond to local labor market conditions. Betts and McFarland (1995) and Kienzl et al. (2007), for example, estimated the impact that labor market conditions, such as unemployment, have on enrollment and attainment, respectively. It is possible that changes in enrollment may also affect local labor market conditions. 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.[2] Local labor market indicators may not adequately account for increases in globalization if workers who are adversely affected by offshoring and immigration immediately return to school. In particular, offshoring and immigration may directly affect enrollment without leading to any changes in the unemployment rate.

Conceptual Foundations

Both offshoring and immigration effectively increase the labor supply available to domestic firms. As these factors increase, domestic firms have access to additional foreign workers who can be employed in both the home and foreign country. Furthermore, offshoring and immigration predominantly entail relocating low-skilled tasks abroad and an influx of low-skilled workers.[3] These global forces constitute a labor supply shock that disproportionately affects low-skilled native workers. Naturally, low-skilled native workers have an incentive to respond to this increased competition by becoming more skilled; they can avoid direct competition with foreign workers by acquiring the training and knowledge that move them up the skill distribution. Ostensibly, increases in offshoring and immigration will lead to native workers returning to school. Although this is an intuitively appealing result, there is

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[2] Black et al. (2005) used fluctuations in coal prices to examine the impact of an exogenous local shock on high school enrollment.

[3] Card (2005) showed that immigrants are less skilled than natives. Offshoring, to date, largely occurs in manufacturing industries (see Blinder (2005); Amiti and Wei (2009); and Olney (2011)). Workers in these industries tend to be less skilled (U.S. Census Bureau (2000)).

little empirical evidence supporting this hypothesis.

We expect college enrollment to increase in response to offshoring and immigration; however, the impact may be larger at particular types of institutions. Specifically, the enrollment response to offshoring and immigration is likely to be strongest at community colleges, for a number of reasons. First, workers displaced due to globalization will find appealing the features of the typical community college—the short time frame required to complete a degree, the emphasis on technical skills, and the relatively low cost of tuition.[4] Marginal workers affected by offshoring and immigration are unlikely to commit the time and money required to attend a four-year institution and indeed, the opportunity costs of attending a four-year institution for displaced workers are high. Kane and Rouse (1999), for example, discussed 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. Although many four-year institutions are constrained by the available housing options, community colleges generally do not face these supply constraints. In addition, they tend to adopt an open admissions policy (Kane and Rouse 1999), as well as enjoy greater flexibility in adding or subtracting courses in response to demand.

Finally, unlike four-year institutions, which attract students from various states, community colleges predominantly draw students from the local region. Thus, local labor market conditions may have a more substantial effect on community college enrollment. In contrast, local labor market conditions may affect enrollment at four-year institutions in a number of different states due to

student mobility. For all of these reasons, we expect the response of enrollment to offshoring and immigration to be more elastic at community colleges than at four-year institutions.

The impact of offshoring and immigration on community college enrollment may differ depending on the location of the institution. Since community colleges serve primarily students from the local region, the implications for enrollment may differ based on the relative impact of offshoring and immigration in that area. Offshoring to date is most prevalent in the manufacturing industry and the majority of manufacturing jobs are located in urban areas. Thus, we expect offshoring to have a stronger impact on enrollment at community colleges that are located in cities. At the same time, immigrants compete not only for manufacturing jobs in urban areas, but also for service and agricultural jobs in rural areas. We expect, therefore, that immigration will have a fairly homogeneous impact on enrollment at community colleges in all types of locations.

In addition to heterogeneous institution effects, offshoring and immigration likely differ in their impacts on various types of students. Specifically, we expect globalization to affect the enrollment of older students relatively more so than that of younger students. In contrast to high school students, workers with established careers face acute labor market competition or perhaps displacement due to offshoring and immigration. In response to this global competition, these workers return to school for retraining. By contrast, high school students are unlikely to respond to fluctuations in offshoring and immigration in such an immediate manner. Such students are less aware of increases in global competition and they may have difficulty calculating changes in the present discounted value of future income streams. Thus, we expect the impact of globalization on community college enrollment to be stronger among older cohorts of potential students.

A body of research has also focused on the causes of educational attendance and attainment differences across various minority

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[4] Jacobson et al. (2005) find that technical, vocation-oriented coursework at the community college level can have a large impact on the long-term earnings of displaced workers.

groups.[5] Globalization may be another, relatively unexamined, factor affecting the educational investment decisions of particular racial groups. We estimate, therefore, how offshoring and immigration affect 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.

Estimation Strategy

To determine how globalization affects investment in human capital, we estimate the impact of immigration and offshoring on enrollment using the following equation:

$$Enroll_{i,s,t} = \beta_0 + \beta_1 Img_{s,t-1} + \beta_2 Off_{s,t-1} + C_{i,t-1}\delta + L_{s,t-1}\theta + \lambda_i + \phi_t + \varepsilon_{ist}$$

The dependent variable, $Enroll_{ist}$, 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.[6] Both of these variables are measured at the state level. One practical reason for this is that we are limited in our ability to construct these variables—particularly our measure for *Offshoring*—at a more disaggregated geographic level. However, it may well be that the state is the appropriate level for these variables even if more localized data were available. A large majority of college students, particularly those on the margin of attending, enroll in their state of residence. Public institutions generally give preferential treatment to state residents in terms of acceptance, financial aid, and tuition. Thus, most individuals who

may be induced to return to school would ostensibly choose 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, however, 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 whereas an increase in financial aid will increase enrollment.[7]

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, indicates poor labor market conditions and thus will lead to an increase in enrollment. The final terms in our equation, λ and ϕ, represent institution and year fixed effects respectively.

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 affected by the changes in offshoring and immigration from the previous year. In addition, when this equation is estimated, both

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[5] See Cameron and Heckman (2001) and Card and Krueger (2005).

[6] It is possible that immigration and offshoring may affect enrollments in neighboring states. This type of spillover effect, however, would attenuate our results and thus work against the findings reported in this paper.

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[7] Although not the focus of this paper, there is a substantial literature on what impact we can expect tuition and aid to have on different types of students. See Cameron and Heckman (1998) and Keane (2002) as exemplars of this line of research.

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.

A number of important features of our estimation strategy minimize the potential biases raised by endogeneity issues. First, offshoring and immigration are usually driven by factors such as foreign economic conditions or policy changes that are exogenous to local labor market conditions. For example, 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 (Bartel 1989; Hansen et al. 2002; Cragg and Kahn 1997). Second, there appear to be no studies finding that immigration or offshoring respond to enrollment in community colleges. However, it is possible that immigration and offshoring respond to labor market conditions that might be correlated with community college enrollment. To account for this, we include the labor market characteristics such as the unemployment rate and the income level in our regressions, as well as the institution-level characteristics of tuition and aid.[8] Third, institution and year fixed effects are included in all regressions. Thus, any factors, such as access to credit, trends in community college enrollment, or differences in schools, which do not vary within years or institutions, will be controlled for. Fourth, community college enrollment is measured at the institution level whereas the globalization variables are measured at the state level. It is difficult to argue that changes in enrollment at a community college could substantially affect statewide immigration and offshoring. Fifth, as discussed, all the independent variables are lagged one year. It is highly unlikely that the globalization vari-

ables from the previous year depend on current community college enrollment. Sixth, in the results that follow, we slice the data in a number of ways. It is difficult to argue that a potential endogeneity bias only arises in the places in which we expect and do find significant results. Given all of these factors, we are confident that a causal impact of offshoring and immigration on community college enrollment has been identified. Notwithstanding these assurances, we pursue an additional check for endogeneity biases.

Data and Descriptive Statistics

Institution-Level Data

The data on college enrollment, the dependent variable, come from the National Center for Education Statistics' Integrated Postsecondary Education Data System (IPEDS). This longitudinal dataset provides information on the universe of higher education institutions in the United States and 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 provides data on average in-state tuition and average financial aid received by institution, as well as enrollment by various institution and student characteristics.[9] The enrollment data span the years 2000–2007 for 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.

State-Level Data

We quantify globalization at the state level using measures of offshoring and immigration. Immigration, the unemployment rate, and the median income are constructed

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[8] The results that follow are, however, robust to the exclusion of these control variables, as we show in Table 11.

[9] IPEDS provides data on various forms of aid. In the results presented, we use average federal grant aid per student. However, the results are not sensitive to using alternative aid measures such as institutional or state-level grants, or total aid per student.

using data from the 2000 1% sample of the U.S. Census as well as the American Community Survey (ACS) from 2001 to 2006.[10] Specifically, immigration is defined as the share of a state's working age (18–65) population that is foreign-born. We use the share to account for the fact that the same number of immigrants will have a much stronger effect in a state with a smaller population. Based on work by Card and DiNardo (2000) and Card (2001), we are not concerned that

ployees 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:

$$Offshoring_{st} = \frac{\sum_i \left[\dfrac{GDP_{sit}}{\sum_s GDP_{sit}} * Foreign\_Affiliate\_Empl_{it} \right]}{Domestic\_Empl_{st} + \sum_i \left[\dfrac{GDP_{sit}}{\sum_s GDP_{sit}} * Foreign\_Affiliate\_Empl_{it} \right]} * 100$$

outflows of native workers in response to immigration could affect our measure. Thus, changes in the share of foreign-born residents will offer a good estimate of the relative size of immigrant inflows.[11]

Offshoring is defined as the share of employees at majority-owned foreign affiliates of U.S. firms. Data on foreign-affiliate employment by the industry of the foreign affiliate are provided by the U.S. Bureau of Economic Analysis (BEA). In order to create a state-level measure of offshoring, we follow the general method outlined in Olney (2011). We use the detailed BEA data on the number of foreign affiliate employees by year and 60 industries. These foreign em-

Descriptive Statistics

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). Recall that 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 offshoring vary substantially across states. Figure 1 plots the state averages of immigration against offshoring. We see that globalization affects some states more than others and that some states are heavily affected by only one factor. States such as California and New Jersey have relatively high shares of offshoring and immigration, whereas Montana, Maine, and North Dakota are the least affected by these global forces. Michigan and Indiana have a high degree of offshoring only; states such as Florida and Nevada, however, have high immigrant shares only.

Table 2 presents an annual summary of enrollment and the two globalization measures. The globalization figures are averages weighted by state population. Both offshoring and immigration show a general increase in the extent of globalization, even within the relatively short period examined in this

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[10] Data were obtained from the IPUMS project at the University of Minnesota Population Center, http://usa.ipums.org/usa/.

[11] Though the results that follow use this foreign-born share as the measure of immigration, the sign and significance of the coefficients of interest are robust to using instead the share of recent immigrants in a state. A recent immigrant is defined as a foreign-born resident who moved into the state in the past year. This alternate measure is less desirable due to a lack of data and our inability to calculate this measure for 2000 (since the 2000 Census does not include information about place of residency one year ago); however, the results are consistent.

Table 1. State Averages

State	Total Enrollment	Enrollment Share	Immigration	Offshoring
Alabama	214,473	7.5	3.7	4.6
Arizona	417,485	11.6	17.1	4.5
Arkansas	126,742	7.4	4.5	4.6
California	2,195,971	9.7	33.2	5.2
Colorado	253,005	8.3	11.0	4.3
Connecticut	147,484	6.7	16.2	5.5
Delaware	42,503	8.1	9.3	5.2
Florida	776,948	7.3	22.7	3.5
Georgia	366,512	6.4	10.3	5.0
Idaho	68,001	7.9	6.8	3.9
Illinois	665,780	8.3	14.6	5.2
Indiana	309,056	7.9	4.6	7.2
Iowa	197,449	10.8	3.8	5.1
Kansas	170,285	10.0	5.3	3.9
Kentucky	197,366	7.4	3.0	5.8
Louisiana	203,212	7.3	4.1	4.7
Maine	57,347	6.9	4.2	3.0
Maryland	259,086	7.3	13.3	3.8
Massachusetts	338,077	8.1	16.3	5.1
Michigan	531,266	8.4	6.6	7.9
Minnesota	279,585	8.7	6.2	4.5
Mississippi	132,671	7.4	2.2	3.7
Missouri	293,859	8.1	4.2	4.7
Montana	42,536	7.3	2.7	2.2
Nebraska	103,551	9.6	5.5	4.0
Nevada	92,434	6.2	20.9	3.5
New Hampshire	57,476	6.9	6.2	4.5
New Jersey	331,073	6.1	23.3	5.5
New Mexico	111,509	9.5	10.8	4.3
New York	952,513	7.7	23.9	4.9
North Carolina	415,114	7.5	8.0	5.9
North Dakota	43,272	10.8	2.9	3.2
Ohio	537,610	7.5	4.3	5.9
Oklahoma	191,717	8.7	5.8	4.0
Oregon	176,011	7.6	10.1	5.2
Pennsylvania	579,629	7.5	6.0	4.8
Rhode Island	71,316	10.5	14.3	4.0
South Carolina	185,973	6.9	5.4	4.9
South Dakota	41,868	8.9	2.7	3.6
Tennessee	247,650	6.5	4.5	5.5
Texas	1,070,523	7.6	18.4	5.3
Utah	173,689	11.7	8.7	3.6
Vermont	33,592	8.3	4.8	3.8
Virginia	366,478	7.5	12.1	4.7
Washington	314,454	7.8	13.6	4.0
West Virginia	80,989	7.0	1.7	3.7
Wisconsin	293,426	8.4	4.2	5.2
Wyoming	30,245	9.3	3.4	4.2

Notes: This table includes the state average of total enrollment (2001–2007), the enrollment to adult population ratio (2001–2007), the share of the population that is foreign born (2000–2006), and the share of foreign affiliate employees (2000–2006).

Figure 1. Offshoring and Immigration by State (2000–2006 Average)
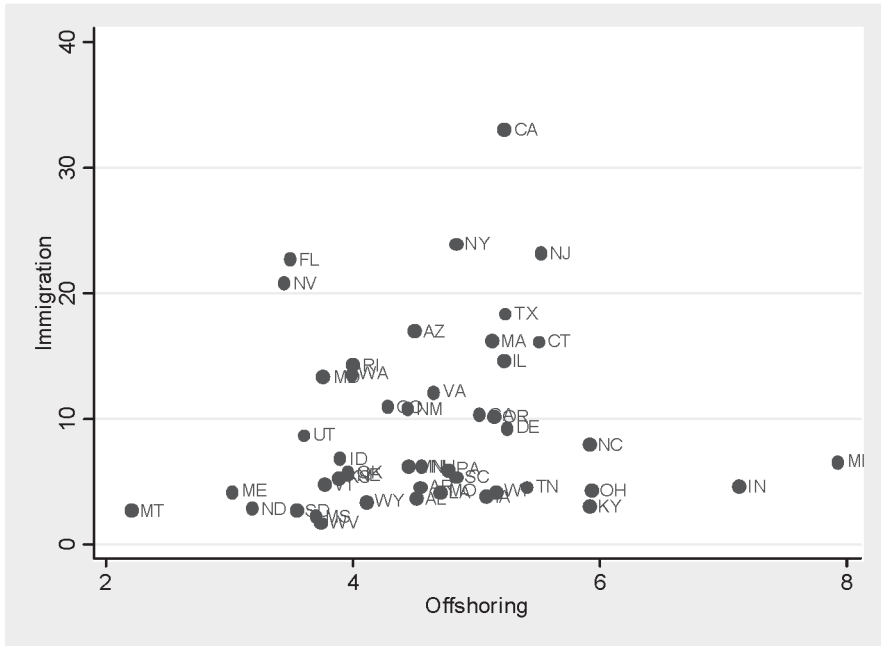
Notes: This figure plots the state average of the share of the population that is foreign born against the state average of the share of foreign affiliate employees.

Table 2. Year Averages

| Year	Enrollment	Enrollment Share	Immigration	Offshoring
2000	13,223,412	7.5	14.4	4.9
2001	13,823,976	7.8	13.9	4.9
2002	14,415,372	8.0	14.2	5.0
2003	14,610,108	8.0	14.6	5.0
2004	14,889,081	8.1	14.4	5.0
2005	15,005,920	8.1	14.7	5.1
2006	15,204,562	8.1	15.0	5.2
2007	15,572,636	8.2	-	-

Notes: This table includes the total annual enrollment and the enrollment to adult population ratio. Annual averages of the share of the population that is foreign born and the share of foreign affiliate employees are weighted by state population.

analysis. Note that undergraduate enrollment increases over this period at a relatively rapid rate (14.5% 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, providing insight into the dimensions and characteristics of the dataset used in this study. 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. Percentage Changes in Offshoring
and Immigration by State (2000–2006)
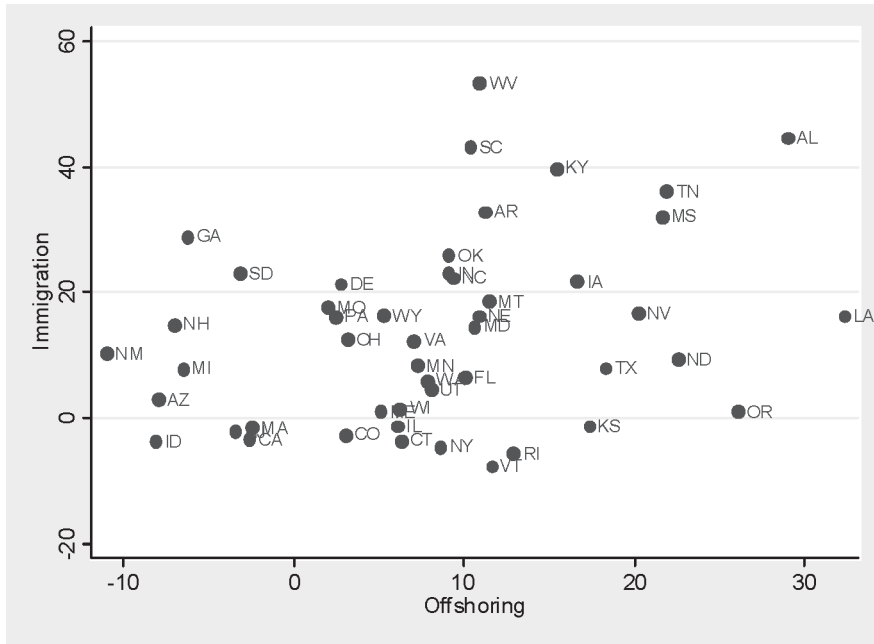
Notes: This figure plots the percent change in the share of the population that is foreign born against the percent change in the share of foreign affiliate employees.

Figure 2 presents the percentage changes from 2000 to 2006 for both measures of globalization. Though 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 affected 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 identify separately the effects of the two main aspects of globalization. This figure indicates, in fact, that the impact has not been felt equally across states despite the fact that globalization has had an increasing impact on the U.S. labor market. We next present the re-

sults indicating the extent to which the differential impacts on states has affected investment in higher education.

Results

The basic empirical estimation strategy presented above 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.

Results by Type of Institution

We begin by examining the impact of globalization on all institutions that report total undergraduate enrollment, average tuition,

Table 3. Enrollment by Highest Degree Offered

	All Institutions	*Non-Degree*	*Associate*	*Bachelor +*
Immigration	0.048*	0.092	0.120**	0.001
	[0.029]	[0.218]	[0.054]	[0.025]
Offshoring	0.059	−0.072	0.248***	−0.076
	[0.048]	[0.356]	[0.085]	[0.048]
Unemployment	0.105***	0.365**	0.120**	0.061**
	[0.027]	[0.156]	[0.047]	[0.027]
Income	0.007	−1.114	0.118	0.016
	[0.106]	[0.690]	[0.201]	[0.095]
Tuition	−0.040*	0.119	−0.058*	−0.044**
	[0.021]	[0.098]	[0.032]	[0.021]
Aid	−0.002	−0.012	0.007	−0.001
	[0.007]	[0.024]	[0.012]	[0.008]
Observations	24325	1724	9432	13169
R²	0.99	0.94	0.99	0.99

Notes: Standard errors clustered at the s tate*year level in brackets. All regressions include institution and year fixed effects. All variables are in ln form and the independent variables have been lagged one year.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

and average financial aid. The results are presented in the first column of Table 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% increase in the foreign-born share of the population in a state leads to a 0.5% increase in enrollment at each higher education institution within that state. This result is significant at the 10% level. The offshoring coefficient is positive but insignificant. The coefficients on unemployment and tuition are significant and of the expected sign whereas those for the financial aid and median income variables are insignificant. We might expect these controls to contribute significantly to enrollment fluctuations; however, they may not change much over the period examined and thus would be captured by the fixed effects.

Columns 2–4 of Table 3 present the results of the same estimation strategy, disaggregated by type of institution. The breakdown is by highest degree offered by the institution. Column 2 displays the results for "Non-Degree" institutions, which are largely vocational, beauty, and technical schools. Compared to other types of institutions, there are fewer Non-Degree institutions that

report enrollment figures.[12] The unemployment rate is the only factor that significantly contributes to fluctuations in enrollment at these institutions. Globalization does not significantly affect 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% increase in the foreign-born share of the population in a state leads to a 1.2% increase in enrollment at community colleges in the state whereas a 10% increase in the share of jobs offshored leads to a 2.5% 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

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[12] Institutions 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.

Table 4. Community College Enrollment by Urbanization

	Total	*Large City*	*Small City*	*Towns & Rural*
Immigration	0.120**	0.217*	0.124*	0.093**
	[0.054]	[0.123]	[0.067]	[0.047]
Offshoring	0.248***	0.465***	0.340***	0.100
	[0.085]	[0.149]	[0.119]	[0.080]
Unemployment	0.120**	0.272***	0.165***	0.014
	[0.047]	[0.095]	[0.054]	[0.045]
Income	0.118	−0.019	0.180	0.133
	[0.201]	[0.414]	[0.226]	[0.190]
Tuition	−0.058*	−0.028	−0.142***	−0.024
	[0.032]	[0.036]	[0.053]	[0.028]
Aid	0.007	0.008	−0.008	0.017
	[0.012]	[0.026]	[0.017]	[0.016]
Observations	9432	2893	2447	4092
R^2	0.99	0.99	0.99	0.98

Notes: Standard errors clustered at the state*year level in brackets. All regressions include institution and year fixed effects. All variables are in ln form and the independent variables have been lagged one year.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

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, which is consistent with the intuition discussed above. Workers who are displaced likely find the short time frame for earning a degree or certificate and the emphasis on technical skills appealing at community colleges; these institutions 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.[13]

Results by Urbanization of Institution

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. Conversely, increases in immigration may affect enrollment in both urban and rural settings.

Table 4 presents the estimation results examining enrollment response by the level of urbanization of the institution.[14] The results indicate that immigration has a significant positive effect on community college enrollment in all types of locations. Conversely, offshoring has a positive significant effect on enrollment in urban areas but no effect on enrollment in rural areas. These results confirm the notion that different areas of a state may be affected by globalization to different degrees. Specifically, offshoring increases enrollment predominantly in urban areas

[13] Though the results are significant only at the community college level, it is possible that this is because increasing costs force more students to start at this level and transfer to other institutions later. To investigate this, we regressed enrollment at bachelor's institutions on the globalization variables lagged two and three years, but again, found no significant results.

[14] The urbanization measure is constructed by IPEDS using information on an institution's address. The "large city" category captures Metropolitan Statistical Areas (MSAs) with populations over 250,000, "small city" includes MSAs with populations less than 250,000, and "towns & rural" includes regions that are located outside MSAs.

Table 5. 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**	0.081*	0.032	0.080	0.259***	0.274***	0.400***	0.368***
	[0.054]	[0.046]	[0.065]	[0.067]	[0.068]	[0.074]	[0.080]	[0.102]
Offshoring	0.248***	−0.089	0.020	0.281***	0.427***	0.295**	0.163	0.006
	[0.085]	[0.075]	[0.108]	[0.104]	[0.119]	[0.124]	[0.117]	[0.192]
Unemployment	0.120**	0.041	0.052	0.014	0.108*	0.201***	0.184***	0.230***
	[0.047]	[0.051]	[0.056]	[0.052]	[0.060]	[0.064]	[0.067]	[0.078]
Income	0.118	0.416**	0.086	0.132	−0.139	−0.189	−0.163	−0.134
	[0.201]	[0.197]	[0.261]	[0.253]	[0.299]	[0.304]	[0.311]	[0.453]
Tuition	−0.058*	−0.040*	−0.062*	−0.061	−0.091*	−0.063	−0.077	−0.128*
	[0.032]	[0.024]	[0.036]	[0.038]	[0.047]	[0.046]	[0.053]	[0.075]
Aid	0.007	0.017	0.019	0.006	0.008	0.018	0.017	0.015
	[0.012]	[0.012]	[0.016]	[0.014]	[0.016]	[0.016]	[0.020]	[0.021]
Observations	9432	8485	8521	8495	8459	8424	8426	8231
R²	0.99	0.98	0.98	0.98	0.97	0.97	0.97	0.96

Notes: Standard errors clustered at the state*year level in brackets. All regressions include institution and year fixed effects. All variables are in ln form and the independent variables have been lagged one year.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

while immigration increases enrollment in all settings. Next, we examine whether globalization has a heterogeneous effect on enrollments of different types of students.

Results by Age

In this section, we examine whether the impact of globalization on enrollment differs across age groups. Table 5 presents the results of regressing enrollments of various age groups on the globalization and control variables. The specification allows for direct comparisons of the magnitude of coefficients across groups. In general, increases in globalization have a much stronger impact on community college enrollment among older individuals. We see that for recent high school graduates (18- to 21-year-olds) an increase in immigration has a significant positive effect on enrollment although offshoring has no effect. It does, however, have a significant positive impact on enrollment among those 25 to 39 years old. Immigration has a significant positive impact on enrollment for all age categories above 30 years old.

These results are consistent with our predictions. Older individuals respond to direct job displacement caused by globalization by returning to school. Although younger individuals have a higher net present value of future earnings resulting from an associate's degree, these results indicate that high school graduates may have difficulty correctly calculating the gains from attending a community college. However, older individuals enroll to replace a set of skills they now know to be obsolete. Overall, these results suggest that the increase in community college enrollment is driven by older individuals returning to school.

Results by Race

In this section, we direct our focus on the impact of globalization on the enrollments of different races. We contribute to research that has examined the causes and consequences of differences in education across racial groups by determining the extent to which various racial groups respond to immigration and offshoring.

Table 6 presents the results of estimating the impact of globalization on community college enrollment by race. Our analysis indicates that enrollments among White, Hispanic, and Asian individuals have all responded in a similar manner to globalization. The estimated coefficients on immigration and offshoring for these groups are positive, significant, and of similar magnitude. However, globalization does not have a

Table 6. Community College Enrollment by Race

	Total	White	Black	Hispanic	Asian
Immigration	0.120**	0.200**	0.043	0.286***	0.199*
	[0.054]	[0.077]	[0.107]	[0.091]	[0.107]
Offshoring	0.248***	0.465***	0.121	0.516***	0.270*
	[0.085]	[0.12 9]	[0.144]	[0.156]	[0.155]
Unemployment	0.120**	0.201***	0.213***	0.248***	0.166**
	[0.047]	[0.064]	[0.073]	[0.078]	[0.075]
Income	0.118	0.233	0.248	0.115	−0.021
	[0.201]	[0.261]	[0.318]	[0.314]	[0.319]
Tuition	−0.058*	−0.094**	−0.098**	−0.102**	0.021
	[0.032]	[0.037]	[0.047]	[0.045]	[0.057]
Aid	0.007	0.022	0.003	0.017	0.027
	[0.012]	[0.018]	[0.019]	[0.022]	[0.023]
Observations	9432	9432	9432	9432	9432
R^2	0.99	0.97	0.98	0.98	0.97

Notes: Standard errors clustered at the state*year level in brackets. All regressions include institution and year fixed effects. All variables are in ln form and the independent variables have been lagged one year.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

significant impact on the community college enrollment of Black students. It is not clear from the analysis whether this is a result of Blacks being less affected by changes in globalization or being less responsive to these changes. While an interesting question, this falls outside of the scope of this particular study and will be explored further in future work.

Sensitivity Analysis

Additional Measures of Globalization

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 important competition is obtained from the Trade Adjustment Assistance (TAA) program. Workers who lose their jobs as a result of import competition may apply to the TAA program for training, job search and relocation funds, income support, and other reemployment benefits. This is not a perfect proxy for imports, given the logistical process of applying and receiving assistance. This is, however, the best available data on imports at the state level.[15] We expect that an increase in the number of displaced workers due to import competition will increase enrollment in community colleges.

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[15] According to trade.gov, "no OM statistics are available for state-level imports. The collection of state import data presents enormous technical challenges, since it would require tracking foreign goods through the U.S. wholesale and retail distribution systems. Consequently, it is not currently possible, using OM data or any other U.S. trade data, to calculate state trade balances."

Table 7. Enrollment by Highest Degree Offered
(Including Import Competition and Inshoring)

	Non-Degree	*Associate*	*Bachelor +*
Immigration	0.139	0.116**	0.002
	[0.226]	[0.054]	[0.024]
Offshoring	−0.101	0.242***	−0.075
	[0.356]	[0.085]	[0.046]
Import Competition	−0.042	−0.003	0.003
	[0.032]	[0.005]	[0.003]
Inshoring	0.199	0.037	−0.046***
	[0.161]	[0.036]	[0.016]
Unemployment	0.406**	0.117**	0.065**
	[0.169]	[0.047]	[0.026]
Income	−1.455**	0.110	0.041
	[0.655]	[0.202]	[0.092]
Tuition	0.120	−0.057*	−0.045**
	[0.099]	[0.031]	[0.021]
Aid	−0.009	0.006	−0.001
	[0.025]	[0.012]	[0.008]
Observations	1724	9432	13169
R²	0.94	0.99	0.99

Notes: Standard errors clustered at the state*year level in brackets. All regressions include institution and year fixed effects. All variables are in ln form and the independent variables have been lagged one year.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

Regressions including the share of workers displaced due to import competition and the share of inshoring are reported in Table 7. 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, and including inshoring and import competition does not change this result. Furthermore, import competition, measured using data from the TAA, does not significantly affect enrollment at any type of institution. Inshoring has no impact on enrollment at non-degree and associate degree-granting institutions, but 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 otherwise consider enrolling at four-year institutions. We conclude that the fundamental relationship between immigration, offshoring, and enrollment is robust to the inclusion of inshoring and import competition.

Enrollment by Residency Status

We have interpreted the positive coefficient on immigration as an indication that natives respond to influxes of immigrants by returning to school. An alternate interpretation is that the positive coefficient implies immigrants themselves are more likely to enroll at community colleges. If this were true, we would expect immigration to affect the elasticities of some racial groups more than others. Specifically, since recent immigrants are predominantly Hispanic and Asian, immigration should have a relatively stronger effect on Hispanic and Asian enrollments. The fact that immigration affects White, Hispanic, and Asian enrollments in a similar manner, as Table 6 shows, refutes this theory. These results suggest instead that enrollment among these different racial groups occurs in response to immigration, rather than that immigrants are simply more likely to enroll in a community college.

As an additional robustness check, we gathered IPEDS data on the enrollment of non-resident aliens at community colleges.

Table 8. Community College Enrollment by Residency Status

	Total	*Native*	*Non-Resident Alien*
Immigration	0.120**	0.116**	0.082
	[0.054]	[0.053]	[0.130]
Offshoring	0.248***	0.254***	−0.330
	[0.085]	[0.084]	[0.225]
Unemployment	0.120**	0.124***	−0.132
	[0.047]	[0.047]	[0.106]
Income	0.118	0.126	0.566
	[0.201]	[0.200]	[0.551]
Tuition	−0.058*	−0.058*	−0.084*
	[0.032]	[0.032]	[0.049]
Aid	0.007	0.007	0.002
	[0.012]	[0.012]	[0.025]
Observations	9432	9432	9432
R²	0.99	0.99	0.92

Notes: Standard errors clustered at the state*year level in brackets. All regressions include institution and year fixed effects. All variables are in ln form and the independent variables have been lagged one year.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

We then broke total undergraduate enrollment at these institutions into two categories: non-resident alien and native. Table 8 presents the results of regressing these categories of enrollment separately on the standard set of independent variables. The results in column 3 indicate that no significant increases in enrollment occurred 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.

Low-Skilled and High-Skilled Immigration

Although immigrants to the United States are on average less skilled than natives (Card 2005), there is substantial variation in the skill level among these immigrants. Our findings thus far reveal that community college enrollments increase in response to total immigration. However, it is possible to examine more carefully how community college enrollments respond to immigrants of different skill levels.[16] Specifically, we expect the immigration of low-skilled workers to lead to an increase in enrollment since low-skilled native workers will presumably respond to this increase in competition by becoming more skilled. However, the impact of high-skilled immigration is less clear since an inflow of skilled workers may put downward pressure on the returns to skill.

Table 9 reports the results in which immigration is decomposed into a low-skilled immigrant share and a high-skilled immigrant share. A low-skilled immigrant is defined as a person with a high school degree or less and a high-skilled immigrant is defined as a person with more than a high school degree. Consistent with our previous results, we find that immigration affects enrollments solely at community colleges. In addition, the results in Table 9 indicate that only low-skilled immigration increases community college enrollments whereas high-skilled immigration has no significant impact on enrollments. These findings are consistent with the arguments presented above; moreover, they provide additional evidence that low-skilled

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[16] A similar analysis for offshoring is impossible due to data limitations.

Table 9. Enrollment by Highest Degree Offered with Low- and High-Skilled Immigration

	Non-Degree	*Associate*	*Bachelor +*
L_Skill Immigration	0.109	0.117***	−0.005
	[0.198]	[0.039]	[0.021]
H_Skill Immigration	−0.062	−0.011	0.019
	[0.187]	[0.042]	[0.027]
Offshoring	−0.086	0.239***	−0.079*
	[0.356]	[0.084]	[0.047]
Unemployment	0.360**	0.124***	0.061**
	[0.156]	[0.047]	[0.027]
Income	−1.047	0.138	−0.002
	[0.710]	[0.200]	[0.096]
Tuition	0.120	−0.061*	−0.044**
	[0.098]	[0.031]	[0.021]
Aid	−0.011	0.007	−0.001
	[0.024]	[0.012]	[0.008]
Observations	1724	9432	13169
R²	0.94	0.99	0.99

Notes: Standard errors clustered at the state*year level in brackets. All regressions include institution and year fixed effects. All variables are in ln form and the independent variables have been lagged one year.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

natives are responding to an increase in competition from low-skilled immigrants by enrolling at community colleges.

Endogeneity

As indicated above, potential endogeneity concerns are minimized due to our estimation strategy, which includes fixed effects, controls for labor market and institution characteristics, lagged independent variables, and different levels of aggregation. Furthermore, we view offshoring and immigration to be determined predominantly by factors that are exogenous to local labor market conditions. For the sake of argument, however, suppose that enrollments affect offshoring and immigration in a given region in a manner that is not adequately controlled for with our labor market and institution variables. Specifically, an increase in enrollments may lead to a relatively limited supply of low-skilled workers there, which in turn may encourage immigration and offshoring. This form of endogeneity would lead to a spurious positive bias in our coefficients.

As an additional robustness check, we estimate an alternate specification in which

this spurious positive bias would be more severe. Specifically, we regress lagged enrollment on our contemporaneous independent variables. Given the time that it would take for enrollments to affect immigration and offshoring, the potential endogeneity bias would be larger in this specification than in our baseline estimation strategy in which we regress current enrollment on our lagged independent variables. However, in this alternate specification, we are unlikely to estimate a causal impact of offshoring and immigration on enrollments, so significant positive coefficients on our globalization variables would indicate that this endogeneity bias is problematic.

Table 10 reports the results from this placebo regression. The results indicate that offshoring and immigration do not have a significant effect on enrollments at any type of institution, which is consistent with the arguments presented in this paper, since it is unlikely that immigration and offshoring could affect enrollments in the previous year. However, if one were concerned about endogeneity, then this spurious bias in our globalization variables would be even more severe in this specification. The fact that the coefficients on immigration and offshoring

Table 10. Lagged Enrollment by Highest Degree Offered

	Non-Degree	*Associate*	*Bachelor +*
Immigration	−0.420	0.100	0.022
	[0.262]	[0.063]	[0.039]
Offs horing	−0.547	0.118	−0.106
	[0.380]	[0.111]	[0.077]
Unemployment	0.094	0.142**	−0.044
	[0.150]	[0.066]	[0.043]
Income	−0.280	−0.094	0.100
	[0.677]	[0.250]	[0.159]
−	−0.053	−0.140***	−0.078***
	[0.081]	[0.030]	[0.028]
Aid	−0.010	0.023	0.011
	[0.038]	[0.019]	[0.011]
Observations	1586	8291	11508
R²	0.92	0.98	0.99

Notes: Standard errors clustered at the state*year level in brackets. All regressions include institution and year fixed effects. All variables are in ln form and the dependent variable (enrollment) has been lagged one year while all the independent variables are now in the current year.

*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

are insignificant not only suggests that there is little endogeneity bias but also indicates that we have identified a causal impact of immigration and offshoring on enrollments.[17]

The potential endogeneity of the control variables also warrants some attention. We are interested in identifying the true impact of globalization on enrollment and are thus concerned about the controls to the extent that they affect our estimated coefficients on immigration and offshoring. The first column of Table 11 presents our baseline estimates from Table 3 for comparison. Though it is likely that tuition and aid have some impact on enrollment decisions, it is also possible that these variables are determined simultaneously with enrollment. We estimate the baseline community college regression and drop these variables, reporting the results in the second column of Table 11. Moreover, we view these global forces to be

less endogenous with the human capital investment decision than with local labor market conditions, so we examine what happens to our globalization coefficients when we eliminate these controls. The fourth column presents the results excluding tuition, aid, and local labor market conditions from the estimation. In each case, we see that the magnitude and significance of the estimated coefficients on immigration and offshoring are not sensitive to the exclusion of any of the control variables.

Conclusion

Workers in the United States have become increasingly concerned about the impact of globalization on their domestic labor market. To date, research has focused on globalization's effect on labor market outcomes such as wages and unemployment. In this paper, we have examined a dimension not yet explored—the impact of globalization on human capital investment decisions.

Using data on college enrollment, immigration, and offshoring we analyzed whether states that are more exposed to globalization have seen differential changes in enrollment. Results indicate that both immigration

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[17] As a further robustness check, we tried instrumenting for immigration using historical immigrant enclaves (Card 2005; Lewis 2003). However, this instrument does not work as well at the state level as it does at the MSA level, and the different levels of aggregation between the dependent and independent variables complicate this type of analysis.

Table 11. Community College Enrollment Excluding Control Variables

Immigration	0.120**	0.125**	0.138**	0.139**
	[0.054]	[0.055]	[0.055]	[0.056]
Offshoring	0.248***	0.237***	0.214**	0.203**
	[0.085]	[0.088]	[0.086]	[0.090]
Unemployment	0.120**	0.124**		
	[0.047]	[0.048]		
Income	0.118	0.068		
	[0.201]	[0.201]		
Tuition	−0.058*		−0.059*	
	[0.032]		[0.031]	
Aid	0.007		0.008	
	[0.012]		[0.013]	
Observations	9,432	9,432	9,432	9,432
R²	0.99	0.99	0.99	0.99

Notes: Standard errors clustered at the state*year level in brackets. All regressions include institution and year fixed effects. All variables are in ln form and the independent variables have been lagged one year.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

and offshoring have a positive effect on enrollment and that these enrollment responses are stronger among particular types of institutions and among particular groups of students. Specifically, 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 whereas immigration increases community college enrollment in all types of locations. We also find that older individuals are more likely to be affected by globalization, and that Blacks are less affected by it.

These results indicate that individuals are reacting in a rational way to globalization. As the low-skilled labor force faces increasing competition due to immigration and offshoring, native workers are responding by increasing their human capital. These re-

sults raise questions about the need for the government to fund the retraining programs of displaced workers, since American workers are returning to school on their own. One possible alternative policy is for increased governmental support for community colleges, since these institutions play a crucial role in retraining workers displaced due to globalization. The findings of this paper support plans such as the "American Graduation Initiative," initially proposed in July 2009 with the intention of investing more than $12 billion in community colleges over a ten-year period.

We are encouraged by the fact that American workers are responding to increases in offshoring and immigration by becoming better educated, implying that the U.S. labor force is acquiring the skills and knowledge necessary to compete in a global economy.

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