Skilled-Immigrant Metropolitan Destinations and Changing Economic Opportunities for Natives

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Abstract

The impact of immigration on the economic opportunities of native workers is an indefatigable issue in current public policy and politics. Going beyond past studies that do not differentiate immigration consequences by immigrant human capital characteristics, we examine changes between 2005 and 2008 in the area profiles of economic opportunities in relation to growth in the highly skilled immigrant population for 100 largest U.S. metropolitan new and pre-emergent immigrant-receiving areas compared with traditional, established destination places. Annual measures of 1) unemployment and underemployment among low- and high-skill workers, 2) wage growth for high-skill and service sectors, and 3) out-migration of native-born low- and high-skill workers are evaluated using growth curve modeling to demonstrate trajectories of change. Employment-related and out-migration outcome measures are created from post-2000 annual American Community Survey (ACS) data, and wages are taken from the Regional Economic Information System (REIS). Results show that the economic impacts of immigration are different for high versus low skill native workers and by type of metropolitan destination. Higher skill immigration has minimal effects on the economic opportunities of high skill native workers but generally negative impacts on low skill workers, particularly those in new and pre-emerging immigrant destination contexts. Significant variation in effects over time suggests adjustment processes involving native worker out-migration.

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Immigrants' impact on the labor market opportunities of native-born workers is at the heart of immigration reform policy debates. Unfortunately, most current research examines the consequences of immigration as a whole or focuses on increased labor supply of low-skill, mostly Mexican immigrants. Few studies address the potentially different consequences resulting with variation in the human capital characteristics of the foreign-born population or differences in the reception-area labor market. Yet immigrant labor flows tend to be characterized according to the industries that draw in-migrants (e.g., Parrado and Kandel 2008; Kandel and Parrado 2005; Piore 1979), and recent immigrant population redistribution to places of varying size and economic structures has been dramatic (Liaw and Frey 2009; Kandel and Cromartie 2004; Passel and Zimmerman 2001). These trends raise the question of whether the economic consequences of immigration differ for new versus established immigrant destinations. How does the presence of high- versus low-skill immigrants change the area profile of economic opportunities in immigrant destination areas? And does the trajectory of available economic opportunities differ for old versus new areas of immigrant population size and growth?

We address these salient research and policy questions with data from 100 of the largest U.S. metropolitan areas, using growth curve modeling to evaluate trends in native unemployment, underemployment, wages, and out-migration. Our study goes beyond the prior research emphasis on low-skill immigrants, and a failure of previous studies to differentiate the effects of immigrant workers according to their human capital (see Card 2005), by focusing specifically on impacts of the striking emergent trend of increasing numbers of high-skill immigrants settling within new U.S. metropolitan destinations.

From a macro-economic perspective, international migration serves to redistribute labor to the general benefit of both sending and receiving nations, but the popular viewpoint focuses on detrimental impacts on individual workers which drive that equilibrating process – in particular, fears that immigrants will take jobs needed by native workers while driving wages downward. Longhi, Nijkamp and Poot (2008) point out that more than 50 studies published over the last 25 years address these impacts using a variety of methods and data, yielding a "bewildering array of results." Nevertheless, important migration-related outcomes are found to be related to such public goods factors as area welfare and health institutions, environmental quality, and societal problems, and to such household-level private goods factors as household income, housing quality, working conditions, and neighborhood contact opportunities (Val Dalen and Henden 2007). We argue that the skill level of immigrants matters for theoretical and empirical models of the economic impact of immigration on native workers.

We examine changes between 2005 and 2008 in annual measures indicative of the private domain of quality of life in U.S. metropolitan areas receiving recent immigrants to the U.S., including wages by low- and high-skill industrial sector and unemployment, underemployment and out-migration of native-born low- and high-skill workers. Employment-related and out-migration outcome measures are created from the 1-year 2005-2008 American Community Survey (ACS) public use microdata files and wage measures are taken from Regional Economic Information System (REIS) tables. For each metropolitan area, the 2000 Decenniel Census and the 2008 ACS provide data for creating foreign-born skill-ratio measures (the number of high skill relative to low skill working-age foreign born) and for identifying established, new and emerging, and pre-emerging immigrant destination designations according to our recently developed typology of U.S. metropolitan areas (Hall et al., 2009). This typology, shown in

Table 1, categorizes metropolitan areas according to their histories of immigrant receptions and the skill level of immigrants who settle there. Using growth curve modeling, we evaluate changes in economic outcomes in relation to changes in the foreign-born skill ratio (FBSR), by destination type. Our findings demonstrate the changing patterns of private goods – i.e., indicators of economic well being – in areas that have been uniquely successful in attracting high-skill immigrants compared to areas that have been destinations for low-skill immigrants, and variations in these patterns by destination type. Consistent with most past research, we find detrimental impacts on unemployment rates and wages which are quite small but which may have been diminished by native out-migration.

BACKGROUND

Two migration trends motivate our study: 1) the relatively recent movement of immigrants into the "new immigrant destinations" and 2) a rising call for "skills-based" immigration policy that gives more attention to the human capital (including occupational skills and educational attainment) that immigrants bring than to their kinship ties with U.S. citizens (Cornelius and Espenshade 2001). The dramatic growth in and redistribution of U.S. immigrant populations is among the most striking findings from the 2000 decennial census and post-census surveys. The foreign-born as a proportion of the total population increased by 57 percent between 1990 and 2000 (Martin and Midgley 2003), and this growth has continued, with the 2000-2005 period having the highest five-year growth of new immigrants on record (Camorata 2005). Furthermore, immigrants have dispersed across America (US Census Bureau 2004), away from core ports of entry where immigrants have typically concentrated in gateway cities

and states. Immigrant relocation patterns have the potential to "reshape" America (Martin and Midgley 2003), with broad implications for social, environmental, and labor market dynamics.

Labor demands among U.S. industries for both service-oriented and high-tech workers result in considerable variation in the occupational skill structure of immigrants across U.S. metropolitan immigrant destinations research (Hall et al. 2009). One stream of new arrivals is dominated by poorly-educated, low-skill, mostly Latino immigrants; the other, by well-educated, high-skill immigrants. Only some metropolitan areas attract both high- and low-skill immigrants equally. Our ongoing research reveals two fifths of the 144 largest U.S. metropolitan areas to have received at least as many high- as low-skill working-age immigrants in recent years and a third of these places to have attracted substantially more high- than low-skill foreign-born workers.

Although higher skill immigrants may face some of the same occupational hurdles (e.g., employment discrimination) and be underemployed (Batalova & Fix 2008), they may compete more openly with natives for jobs than immigrants with lower levels of human capital (Borjas 2006; Stephan & Levin 2001). Whereas high-skill immigrants are not expected to impact the provision of public goods and services to the extent that lower skill immigrants may, they do potentially increase employment competition for native workers, possibly leading to increased un- and underemployment and out-migration of the native high-skill and declining wages for high-skill jobs.

The classic economic model of labor market competition straightforwardly predicts that in-migration to a market will shift labor supply and demand to result in declining wages and greater competition for jobs in the short-run. Although the potential impacts of immigration range broadly, including inflation, social and environmental consequences as well as labor

market effects, considerable attention has been paid to the latter, with numerous studies in the past three decades that test the native job-loss and wage decline theses (Longhi, Nijkamp and Poot 2008). These studies use different, primarily pre-2000, data sources and analytical techniques and obtain varied results. Generally, they indicate very small, but negative impacts on employment and wages (Lohghi et al. 2008; Friedberg and Hunt 1995). Meta-analysis of studies with comparable estimates indicates that context matters – the impact of immigration on employment and wages depends on the flexibility of the particular market and the ease with which native workers are able to relocate (Longhi et al. 2008). If labor markets in places with different immigrant-reception histories respond differently to the influx of immigrant labor, we expect that the impacts of high- versus low-skill immigration will be different in established, new, and pre-emergent (i.e., places that are home to foreign born but have only minimal histories of immigrant reception) immigrant destinations.

Recent cross-nation analysis supports this expectation generally but also demonstrates the importance of the immigrant skill distribution and how its consequences vary across the native-worker skill distribution. Whereas it is clear that a labor supply shift is inversely linked with wage growth, the consequences for different skill groups depends on the employment-related capital of migrants, with greater income inequality resulting where immigrants are low-skill workers and lower income inequality resulting where immigrants have greater human capital (Aydemir and Borjas 2007). Reduced income inequality may result if high-skill wages stagnate while low skill wages increase or if low-skill wages grow at a greater rate than high-skill wages. Thus, whether larger shares of high-skill immigrants impact the economic opportunities of high-skill workers only, low-skill workers only, or both high- and low-skill workers, lower levels of income inequality may result. Based upon Aydemir's and Borjas' (2007) finding, we expect that

wages in destinations with larger or increasing proportions of high-skill immigrants will show slower wage growth for the high skill than places with smaller FBSRs.

Immigrant workers may "displace" the native-born if they must accept lower compensation for their labor (e.g., Ruhs 2002), possibly driving natives from the geographic area (Borjas 2006; Card 2001; Borjas, Freeman, and Katz 1997; Frey 1995; Filer 1992). Indeed, immigrants are found to earn considerably less than native workers when controlling for pertinent human capital and contextual factors (2000), and Rosenblum (2001) suggests, as part of the reason, that foreign-born temporary high-skill workers may receive depressed wages because they have limited legal rights in the U.S. system. With the substitution of native workers by less expensive foreign labor, we expect wages to decline and native unemployment and underemployment or out-migration to increase over time. This may be particularly critical for higher skill workers and industries where the ratio of high- to low-skill immigrant workers has become higher (Appold 2005), and conversely, for lower skill workers and the service industry where that ratio has become lower. That is, a more refined definition of the labor market is more likely to produce comparisons of workers who are most likely to substitute for one another (Longhi et al. 2008). Of course, as several researchers point out, immigrant and native workers may not substitute perfectly for one another within skill levels (Jaeger 1996; Cortes 2005; Ottaviano and Peri 2006). If this perfect-substitutability assumption does not hold, we expect the impacts for high skill native workers will be less severe than if the assumption were met; that is, if high skill immigrant workers are not perfect substitutes for high skill native workers, we do not expect to find large impacts of high skill immigrants on native economic opportunities.

Alternatively, immigrant workers may "replace" native workers who previously left geographies for better opportunities elsewhere. Contrary to this notion, however, prior studies

indicate that immigrants tend to be drawn to places of economic growth (Freiberg and Hunt 1995), where employment is more certain and wages tend to be higher, and such places seem unlikely to be abandoned by native workers. Indeed, this aspect of immigrant location creates an endogeneity problem that can bias estimates of the economic consequences of immigration toward zero. Others argue that immigrants' innovativeness may increase employment and wages by creating new jobs (Lofstrom 2000). Although it is also possible that any jobs created by immigrant entrepreneurs may be more likely to go to other immigrants rather than to natives (Rosenblum 2001), this process potentially offsets any depression of wages and employment.

Overall the effect of immigration on native economic opportunities appears to be complicated by a variety of factors that may counteract one another. As Rosenblum (2001) states regarding high-tech immigration, "the overall effect ... on the U.S. labor market is poorly understood." Our use of longitudinal data to examine the effects of change over time in immigrant skills on shifts in economic opportunities of native workers contributes new evidence to fill the research gap concerning the consequences of highly skilled versus very low-skilled immigrants. Importantly, the use of longitudinal data permits tests of the influence of change in the FBSR as well as the level of the FBSR on change in our economic outcomes. If high-skill immigrants are drawn to places with better economic opportunities, the association between FBSR level and economic outcomes will be positive and cannot clearly indicate a detrimental effect of immigration. With statistical control for this relationship, an increase or decrease in an outcome over time that is related to the shift over time in the FBSR provides a clear indicate that the immigrant skill ratio affects native economic opportunities.

METHODS

Our goal is to evaluate the change in annual wages and native unemployment, underemployment, and out-migration rates between 2005 and 2008 to determine whether the changing foreign-born skill ratio in an area contributes to a loss of economic well being for native-born workers. A total of 100 of the largest U.S. metropolitan areas contribute 3 to 4 years of data, yielding 300 to 400 area-year data points for analysis. (Only 3 years of wage data are currently available for the study period; 4 years of unemployment, underemployment, and out-migration data are available.) We examine total wages, and wages in professional and technical jobs, in the health care industry, and in food and accommodation service-sector jobs. For employment rate, underemployment rate and out migration rate, we evaluate trends for the working age population as a whole, as well as for the high-skill and for the low-skill working age populations.

For each of these outcomes, we are interested in the association between the change in the outcome and the change in the foreign-born skill ratio (FBSR) – measured as the ratio of the number of working age foreign born who have a college degree to the number who have less than a high school education – controlling for the level of the FBSR, the percent of the total population that is foreign born ("percent foreign born"), the total population size, overall job growth, national region and time. We further examine whether this association differs by destination type, defined as either an established, new/emerging, or a pre-emerging immigrant destination; the extent to which these differences are explained by the percent of the population that is foreign born; and utilizing interaction terms, whether the effect of time varies across destination type. Where a statistically significant curvilinear relationship with time is found, we also include the squared term for time.

Endogeneity of immigration to places with better employment opportunities presents a

risk of underestimating detrimental effects of immigrant labor (see Longhi et al. 2008; Card 2001; Borjas 1999; Friedberg and Hunt 1995). A typical solution is the instrumental variable approach, where the percent of the population that is foreign born is taken into consideration in determining the instrument. If destination choice is dependent on historical patterns of settlement and migration networks, rather than the draw of better employment opportunities, this endogeneity problem may be less severe (Friedberg and Hunt 1995). Our examination by immigrant destination type explicitly examines economic trajectories across places with different immigration histories, but our inclusion of both the percent foreign born and the 2008 level of FSBR helps to reduce this risk of bias. Whereas these control variables help to overcome the endogeneity of immigrants' choosing destinations where employment and wages are more favorable, our focus on the effect of the change in the FBSR over time shows how economic indicators have shifted with the changing human capital composition of the foreign labor supply. A significant interaction between change in FBSR and the variable "time" is considered strong evidence of an immigrant labor influence. Three-way interactions of FBSR, time, and destination type are also tested to determine the role of immigration history in this process.

The Model

SAS PROC MIXED is used to fit area-specific growth models based upon an unstructured error variance-covariance matrix. This procedure allows for both random and fixed effects and adjusts for clustering within area. Our models specify random effects for the intercept and metropolitan area. This is a two-level model where level 1 is a linear area-level growth model yielding within-area effects, and level 2 identifies variation and the parameters in that growth model as random effects that are not related to the area-level covariates, yielding

between-area effects. Tables present variance-covariance parameters for each model as indication of the degree of variation in the intercept, slope and error which is not explained by the models. We also present model fit statistics for comparing nested models.

Data are prepared as a longitudinal file with one observation per geographic area per year. Grand-mean centering of the independent variables aids interpretation of their coefficients as average effects across areas, and time is coded to range from 0 to 4, with the first year of observation coded as 0 so that the intercept represents the level of the outcome at the beginning of the observation period (Singer 1998). Combining level 1 and level 2 model equations, this model can be written as

$$
\begin{aligned}
Y_{ij} = {} & \beta_{00} + \beta_{10}(Time)_{ij} + \beta_{01}(FBSR)_{ij} + \beta_{02}(FBSR\ Change)_{ij} + \beta_{03}(Emerging/New\ Destination)_{ij} \\
& + \beta_{04}(Pre\text{-}emerging\ Destination)_{ij} + \beta_{05}(\%\ Foreign\ born)_{ij} + \\
& \beta_{06}(FBSR\ Change)(Emerging/New\ Destination)_{ij} + \beta_{07}(FBSR\ Change)(Pre\text{-}emerging \\
& Destination)_{ij} + \boldsymbol{\beta}_{0x}\boldsymbol{X}_{ij} + \beta_{11}(FBSR\ Change)(Time)_{ij} + \beta_{12}(Emerging/New \\
& Destination)(Time)_{ij} + \beta_{13}(Pre\text{-}emerging\ Destination)(Time)_{ij} + \beta_{14}(FBSR \\
& Change)(Emerging/New\ Destination)(Time)_{ij} + \beta_{15}(FBSR\ Change)(Pre\text{-}emerging \\
& Destination)(Time)_{ij} + \mu_{0j} + \mu_1(Time)_{ij} + r_{ij},
\end{aligned}
$$

where $\boldsymbol{X}_{ij}$ is a vector of characteristics including total population size, job growth, and national geographic region for metropolitan area *j* at observation *i;* $\boldsymbol{\beta}_{0x}$ is a vector of parameters corresponding with the vector of characteristics $\boldsymbol{X}$ which contribute to the value of the intercept; μ_{0j} is the between-area random component of the intercept; $\mu_1(Time)_{ij}$ is the area/time-specific random component of the slope; and r_{ij} is the within-area random component for area *i* at observation *j*; and covariates are centered.

Since the size of the foreign-born population is moderately related to destination type and FBSR change, we present the above model for each outcome, along with corresponding models in which the covariate "Percent Foreign Born" is excluded. Comparisons, across the two models, of fit statistics and of the effects of destination types and change in the FBSR help to evaluate the unique contributions of these variables of greatest interest.

The Variables and Data Sources

REIS, prepared by the Bureau of Economic Analysis (BEA), provides annual employment and wages data, by industry, for metropolitan areas. Our wage outcome, logged wages, is from this source, which currently provides these data from 2001 through 2007. REIS employment data are used to calculate annual job growth from the previous to the current year for 2005, 2006, 2007 and 2008, which is used in our models as a control variable.

The remaining outcome variables are calculated by aggregating weighted data, by public use microdata sample areas (PUMAs) corresponding with each metropolitan area, from the annual 2005 through 2008 ACS 5-percent public use microdata samples. (The crosswalk for relating PUMAs with other geographic designations is available from the Missouri Census Data Center, http://mcdc2.missouri.edu/websas/geocorr2k.html). Unemployment is identified as being in the labor force but without a job by the Census Bureau-created employment status variable for working age (25 through 64 years) adults who are not identified as foreign born. Following Clogg and Shockey (1984) and De Jong and Madamba (2001), we define underemployment among the working-age native-born according any one of following criteria: being employed and looking for a different job, being an employed male who works less than 35 hours per week, being an employed female who has no children under the age of 6 years and

works less than 35 hours per week, being employed full-time and having an at- or below-poverty-level income, or having a college education and being employed in an occupation other than professional/technical, administrative or managerial. Unemployment and underemployment are expressed as rates, calculated as the number in the category as a percent of persons in the labor force. Out-migrants are identified as individuals who reported having migrated in the past year and whose prior residential PUMA is one of those comprising a metropolitan area in our study. Expressed as a rate, we calculate this measure based on the number of out-migrants expressed as a percent of persons who lived in the metropolitan area in the previous year. We create these measures for all working-age adults; for high-skill working-age adults, defined as those with a college degree; and for low-skill working-age adults, defined as those with less than a high school diploma.

Foreign-born skill ratio (FBSR) is calculated as the number of working-age foreign-born having a college degree divided by the number of working-age foreign born having less than a high-school diploma times 100. Change in the FBSR is calculated as percent change in the measure between 2000 and 2008 (the difference between the FBSR in 2008 and the FBSR in 2000 divided by the FBSR in 2000 times 100). FBSR in 2000 is determined using items on nativity and educational attainment from the 2000 Decenniel Census Public Use Microdata Sample. Detailed tables from the 2008 1-year ACS provide information for calculating the FBSR in 2008. The ACS detailed tables also provide annual data on area total population size (in 1000s) and foreign-born as a percent of the population, which are included, along with U.S. geographic region of the metropolitan area, as control variables in our models.

Our immigrant destination typology builds upon Singer's (2005) frequently-used typology of U.S. immigrant destinations by expanding the sample of metropolitan areas to

include medium-sized metropolitan areas (i.e., including areas with populations of at least 250,000 in 2008), by including post-2000 patterns of growth and change in metropolitan immigrant population, and by disaggregating these destination types according to inequalities in immigrant human capital. Our typology is based upon over a century of Census PUMS files plus micro-data from the 1900-2000 decennial censuses and the 2008 American Community Survey (ACS) aggregated to the metropolitan level. These data are used to estimate the size and change in the foreign-born population and the distribution of immigrant skill-levels for each observation year in each metropolitan area, which are then used to identify 12 primary destination types among U.S. metropolitan areas by cross classifying them according to their history of immigrant reception and the ratio of low- to high-skill immigrants living there. For this paper, we collapse these 12 categories into three – established destinations (with a longer term history of immigrant reception), new and emerging destinations (those which have received a larger influx of immigrants as a percent of the total population than observed for the nation as a whole since World War II), and pre-emerging destinations (those which are home to smaller-sized foreign-born populations and have not experienced growth in their foreign-born populations as great as that experienced nationally). Table 1 shows the categorizations for these 100 largest U.S. metropolitan study areas, and Table 2 presents descriptive statistics, overall and by immigrant destination type, for the variables in our models.

RESULTS

Model results are shown in Tables 3 through 6, in which we present coefficients representing contributions of change in FBSR and destination type, with control for FBSR in 2008 and foreign born as a percent of the population, to both the level of the outcome (the

intercept, shown in top rows of the tables) and the change in the outcome over time (the slope, shown in rows below the intercept parameters). All models also control for total population size, overall job growth, and geographic region, the coefficients for which are shown but not discussed here. All models shown have a significantly better fit than the null model, although the amount of variation remaining unexplained in the intercept, slope, and residual varies across the different outcomes.

Unemployment Rate

Table 3 presents results for models regressing the area unemployment rate on our set of covariates. Intercept coefficients show that higher FBSR is associated with lower unemployment overall (models 1 and 2) and for low-skill native-born workers (models 5 and 6). Although this relationship operates in the same negative direction, it is not a significant for high-skill workers (model 3). This finding indicates that the ratio of high-skill to low-skill immigrants tends to be higher in places with lower unemployment rates, suggesting that higher skill immigrants choose to live in better labor markets. There is no significant effect generally of FBSR change on this level.

Unemployment levels are also lower overall and for low-skill workers in pre-emerging destinations. Thus, controlling for immigrant skill ratio, unemployment rates are higher in places with a history of immigrant reception, regardless of the size of the foreign-born population relative to total population there. Nevertheless, for high skill workers, unemployment is greater where immigrants are a larger share of the population. These effects apply to the intercept and represent contributions to the unemployment rate at the beginning of the observation period (i.e., when "time" equals 0).

Although the main effect for FBSR change is not statistically significant (that is, it does not influence the intercept) for any worker category of unemployment, in the case of overall and low-skill unemployment, the FBSR change by destination type interaction terms show that, in emerging/new and pre-emerging destinations where the number of higher skilled to lower skilled immigrants grew between 2000 and 2008, the level of the unemployment rate was higher (models 1 and 5). The effect for emerging/new destinations becomes non-significant with the addition of the variable "percent foreign born" (see models 2 and 6), demonstrating that the difference by FBSR change between established and emerging/new destinations found in models 1 and 5 is inextricably linked with the greater portions of foreign born found in established destinations. Thus, this model suggests that higher skill immigrants were drawn to pre-emerging destinations with lower unemployment. In the case of unemployment among high skill workers, however, change in FBSR is not significantly related with level (intercept) for any destination type.

Slope coefficients are of primary interest to our analysis, as intercepts may indicate conditions that draw immigrants and slopes (i.e., growth in the outcome) are indicative of causal influences. The general trend for the destination-type reference category – established destinations – (with no change in FBSR) is represented by the variables "time" and "time-squared." Parameters for these covariates show that unemployment trended downward, with a shift upward in the later years in all models, as shown in the top left-hand panel of Figure 1. Most important, however, is that this shift upward in overall and low-skill unemployment was greater in places where the FBSR became greater over the period – as the immigrant composition became more highly skilled, native-born workers became more likely to be unemployed. This effect was greatest in emerging/new destinations, where the increase in the supply of foreign

born workers is likely to be more novel compared with in established destinations and more prominent compared with in pre-emerging destinations. Contrary to expectations, this three-way interaction (FBSR change by emerging/new destination by time) is not significant, although it is positive, for high-skill workers (models 3 and 4) and is positive and significant for low skill workers (models 5 and 6).

In sum, the general trend was for unemployment rates to decline at the beginning of the observation period and increase toward the end of the period. The top left panel of Figure 1 shows the combined effects of time, destination type and a one-unit FBSR change, net the effects of other covariates in the model, on the overall unemployment rate. These combined-effects patterns, although showing differences in levels, are quite similar in slope, demonstrating the importance of identifying the time by place effect of the FBSR change variable. Emerging/new destinations actually have a slightly higher rate of growth in unemployment compared with other destinations because the effect of a one-unit change in FBSR is larger than in established or pre-emerging destinations. Of course, the models in Table 3 demonstrate that this effect is significant only for unemployment among lower skill natives. For them, net the effects of other covariates, a 1 percent increase in the FBSR would result in a 0.002 percent increase in unemployment rate in the second year of our observation (0.002 X 1 X 1), a 0.004 percent increase in the third year (0.002 X 1 X 2), and a 0.006 percent increase in the fourth year (0.002 X 1 X 3), with an average cumulative increase of 0.012 percent between 2005 and 2008 (recall that at time 1, the variable "time" is coded "0"; at time 2, it is coded "1"; and so forth). In emerging/new destinations, this cumulative increase due specifically to change in the FBSR would be 0.072 percent ([{(0.002 X 1 X 1) + (.01 X 1 X 1 X 1)} + {(0.002 X 1 X 2) + (.01 X 1 X 1 X 2)} + {(0.002 X 1 X 3)) + (.01 X 1 X 1 X 3)}] = 0.072). This value may seem small, but

the average percentage change in FBSR for emerging/new destinations was 23.9, the increase is almost 2 percent (0.072 X 23.9 = 1.72). This evidence supports the notion that high-skill immigration increases competition for jobs among native workers with lower educational attainments, and this competition likely is felt the most in emerging/new destinations. Our results provide little evidence, however, that experiencing a growth in high-skill relative to low-skill immigrant workers increases unemployment among high-skill native workers.

Underemployment

Underemployment of natives is another measure with potential to indicate a possible displacement process, and models regressing underemployment on our set of covariates are shown in Table 4. FBSR level increases the intercept for overall underemployment but has non-significant opposite-sign effects for high- compared with low-skill natives. Thus, the overall positive effect is applicable only for natives with a high-school education but no college degree. Change in the FBSR has a depressing effect on underemployment levels generally and for high-skill natives, although the effect for the highly skilled is explained partly by foreign born as a percent of the population (compare models 3 and 4).

For low-skill natives, the effect of FBSR change on level of underemployment is positive, with an effect on a change in underemployment trajectories over time shown only in pre-emerging destinations (models 5 and 6). This finding indicates that high skill natives may displace lower skill native workers. In this case, relative to the effect in other destination types, a 1 percent increase in the FBSR would result in a 0.008 percent increase (-0.002 + 0.01 = 0.008) in low-skill underemployment at time 2 (coded so that time=1), and an additional 0.016 percent increase in the next year (coded so that time=2), followed by an

additional increase of 0.024 the subsequent year (coded so that time=3). Thus, low-skill workers in pre-emerging destinations where FBSR increased 1 percent between 2000 and 2008 would have experienced a total 0.048 percent increase in their underemployment rate between 2005 and 2008. This 1-unit-based effect is very small, resulting in a 0.33 percent increase over the period on average. Even where FBSR change was greatest (29.6 percent), the estimated increase totals 1.42 percent, and in no other destination type is the FBSR interaction with time even marginally statistically significant. Thus we see little difference in the growth curve for low-skill natives in pre-emerging destinations compared with that for established destinations in the top right-hand panel of Figure 1. Again, this panel shows the combined effects of time, a one-unit change in FBSR, and destination type, net the effects of other covariates.

Clearly the most powerful of these effects is destination type, with low-skill workers in pre-emerging destinations experiencing the highest levels of underemployment and in emerging/new destinations, the lowest levels. Indeed, as shown in models 3 and 4, underemployment among the highly skilled was lowest in emerging/new destinations experiencing the greatest growth in the FBSR. Thus, our evidence does not support the notion that high-skill immigration increased job mismatch for high-skill natives. Rather, coefficients for the intercept indicate that high skill immigrants may be drawn to stronger labor markets where natives are more likely to be employed in jobs that match their skills.

Wages

Results for wages (logged) are shown in Table 5. In metropolitan areas, wage levels (intercept terms, models 1 and 2) tend to be higher where the FBSR is greater but to be lower in places where the FBSR increased over the period, particularly in established destinations (i.e.,

the FBSR change X destination type interactions are both positive). Wages increased over time, although more slowly in pre-emerging destinations where the FBSR became higher over the observation period (see negative slope term for the FBSR change by time by pre-emerging destination interaction). One might expect the slower growth of wages there compared with other destination types because wage levels start lower in pre-emerging destinations (see intercept main effect term for pre-emerging destinations), as shown in the bottom left panel of Figure 1. However, these results show that, among pre-emerging destinations, wage growth was slower where FBSR change was greater, despite the finding that wage levels started higher where FBSR change was greater.

Models 3 and 4 show that for professional/technical sector wage level, change in the FBSR has a similar effect as seen for total wages which is offset in emerging/new destinations compared with the other areas. This finding suggests that areas drawing high-skill immigrants offer higher wages for professional/technical employment in emerging/new destinations. However, nowhere was the effect of FBSR or destination type different over time; that is, the professional/technical-sector wage growth curve is not influenced by FBSR or destination type. Thus we find little evidence that professional/technical workers' wages are detrimentally impacted by the presence of high skill foreign born workers.

Likewise, wage level in the health care industry was higher where FBSR was higher but lower where FBSR increased (models 5 and 6). Not only did wages start higher in emerging/new destinations, they were started higher still in these destinations where the FBSR increased more between 2005 and 2008. As found for overall wages, health sector wages grew over time, with greatest growth occurring in established and emerging/new destinations where FBSR change was greater. Thus, for the health sector in places with some history of immigrant

reception, growth in the proportion of foreign born who have high human capital is linked with wage growth that is more positive than that in pre-emerging destinations. This finding counters popular arguments that immigrants drive down wages, unless the wage depression in pre-emerging destinations shows that such depression occurs only early in the immigrant-reception history of the destination.

Wage levels for low skill workers were similarly influenced by the presence and growth of high skill immigrant workers (models 7 and 8). Wages started lower for accommodation and food service workers where the FBSR became higher over the period, although places with higher shares of high- relative to low-skill immigrants in 2008 offered higher wages for these lower skill workers. Service wages were higher still in emerging/new destinations compared with other areas, but wage growth was not influenced by destination type or change in FBSR. Thus we cannot conclude that the immigrant skill ratio influenced wage growth for low skill workers; rather immigrants are drawn to places offering better service sector wages.

Out-Migration

One explanation for the lack of evidence for an effect of high-skill immigration on the economic opportunities of high-skill native workers is that they may respond to changes in the labor supply by migrating. We see a positive relationship of FBSR in 2008 and a negative relationship of change in FBSR with native out-migration levels generally and among high skill natives (Table 6). However, out-migration grew higher over time for the high skill in places where the FBSR increased (see slope parameters in models 3 and 4). This finding supports a "displacement" interpretation such that native out-migration is a response to increased immigrant labor supply. Conversely, models 5 and 6 show that out-migration of low-skill natives started

higher in places with higher change in FBSR, particularly in emerging/new destinations, but this higher rate of low-skill out-migration declined over time in all destination types. Although across the board, out-migration was greater at the beginning of the observation period in emerging/new destinations (as seen in the bottom right-hand panel of Figure 1), the decline over time in out-migration was greatest for all places where the FBSR was increasing over the past decade. This finding combined with the declining rate over time of out-migration in these places suggests that a "replacement" rather than "displacement" process occurs for the low skill.

DISCUSSION

In summary, while reviews of past immigration research (i.e. Lohghi et al. 2008; Frieberg and Hunt 1995) have generally indicated small but negative impacts of immigration on the employment and wages of native workers, our results show that the skill level of immigrants and the destination context matters. Specifically, we find that higher skill immigrants have minimal effects on the economic opportunities of high skill native workers but have a generally negative impact on the economic opportunities of low skill native workers, particularly in new and pre-emerging immigrant destination contexts versus traditional destination contexts. These findings are not consistent with the direct labor force competition argument (Borjas et al. 1997). Our findings suggest that immigrant destination labor markets are moving toward adjustments, with replacement and displacement migration of native workers as a key process.

Table 7 summarizes our findings for change in FBSR, as well as for the level of FBSR in 2008 and for emerging/new and pre-emerging destinations compared with established immigrant destination areas at the beginning of the observation period. The latter are indicators of the covariates' contributions to level of the outcome at the beginning of the observation period,

whereas influences contributing to growth in the outcome over the period involve interactions with the covariate "time" and are discussed here as increasing or decreasing the effect over time. While the level of a covariate may indicate a causal effect on an outcome, it is also reasonable that the effect actually reflects an influence of the outcome on the covariate. By evaluating the influence of change in the covariate on change in the outcome, controlling for level in the covariate, we have greater confidence in the potential causality of significant relationships.

There is evidence of increased unemployment in emerging/new destinations which results with an increase in the FBSR, particularly for low skill native workers, although there are no clear effects for highly skilled workers. This effect is greatest in emerging/new destinations, where the greatest impact of immigration would be anticipated, independent of the role of percent foreign born among the population. These findings are consistent with previous research that finds an average across-studies effect of immigration on increased native unemployment of around 0.024 percent per 1 percent increase in foreign-born workers (Lonhgi et al 2008). It is curious, however, that low-, rather than high-, skilled natives are affected by a larger relative increase in higher skill immigrants. Possibly credentialing issues result in imperfect substitution where high-skill immigrants take lower skill jobs. Boyd and Thomas (2002), for example, found evidence of occupational mismatch among Canadian immigrants educated abroad, explained in part by language ability (see Boyd 2001). Our finding that unemployment of low-skill workers increased where the FBSR increased is consistent with such a process.

Likewise, there is no strong evidence that high-skill immigration increases underemployment for high-skill native workers. Indeed, high-skill worker underemployment was significantly lower at the beginning of the observation period than in other places, suggesting that high-skill immigrants were drawn to places with lower underemployment rates.

Only low-skill natives in pre-emerging destinations experienced greater underemployment with higher ratios of high to low-skill immigrants. Although the effect over time in new/emerging destinations is similarly positive (i.e., increasing underemployment compared with in established destinations), this effect is not statistically significant. This finding suggests an adjustment process in which underemployment in places with little historical experience with immigration may be affected at first and then adjust as the place becomes an area of notable immigrant reception. Established destinations have had more time than other destination types to adjust to the availability of immigrant labor, and our analysis may not capture the full range of timing needed to identify such a process or to provide evidence of underemployment as a form of native displacement.

Also suggesting an adjustment process is that wages declined the most in pre-emerging destinations over time where FBSR increased. This finding is not inconsistent with prior studies showing small negative effects of immigration on wages (Aydemir and Borjas 2007; Longhi et al. 2005). We find the effect on wages to differ by industrial sector, where health-sector wages appear to be driven down by high-skill immigrant labor in pre-emerging destinations, but professional/technical are little affected, and food/accommodation service-sector wages increase more over time where FBSR increases more. This positive growth effect on service-sector wages occurs in all destination types. Thus, higher skill immigrants may be receiving higher wages over time in places where they are replacing lower skill native workers.

Our findings may result in part from the patterns of out-migration; others point out that labor market adjustments, such as out-migration or trade and capital flows, may bias the estimated effect of immigration toward zero (Longhi et al. 2008). Although not statistically certain, out-migration from new destinations appears to have begun higher at the beginning of

our observation period. Importantly, out-migration increased most among the highly skilled native born and decreased most among the low-skilled native born where the FBSR was increasing. Although it has been argued that this adjustment process is likely to be greater in larger than in smaller geographic areas (Card 2001), these effects are the same for established, emerging/new and pre-emerging destinations. The need for additional research in which native out-migration is added as a predictor of the economic outcomes is suggested by these findings, although efforts to identify an appropriate lag for the covariate will be necessary.

Many of these findings are marginally statistically significant, but given the argument of Borjas et al. (1997) for analysis at the national level, it may be more difficult to identify a significant effect of immigration in smaller geographic places such as metropolitan areas. Another factor that may minimize our ability to find effects is that our skill ratio measure assumes perfect substitution on the basis of years of education. This assumption can be questioned since educational systems in various immigrant-sending nations are not equivalent to that in the U.S., and since our measure does not take into consideration work experience and job-related capital. Thus, we might expect low-skill workers to be impacted by high skill immigration if immigrants encounter more barriers than natives to high skill employment. Regardless of these limitations, however, our findings provide an important point of reference for future research to understand labor market processes in the presence of low- and high-skill immigrant labor supply increases.

Many argue that the wait for and expense to employers of obtaining foreign-born worker visas and permanent worker green cards limits the ability to hire foreign nationals and stifles innovation and economic growth in the U.S. (Anderson and Miller 2009; Papademetriou et al. 2009). Our findings suggest that increasing access to such visas might be targeted to industries

with more careful consideration of the existing labor supply and the history of immigrant reception in the metropolitan area in order to minimize unwarranted adjustments in the native labor supply. They also indicate a need to reduce the number of low-skill native workers by improving the educational attainment of the American workforce

REFERENCES

Anderson, Stuart, and Miller, David. 2009. Legal Immigrants: Waiting Forever. Arlington, VA: National Foundation for American Policy (www.nfap.com).

Appold, Stephen J. 2005. The Weakening Position of University Graduates in Singapore's Labor Market: Causes and Consequences. *Population and Development Review*, 31(1): 85-112.

Aydemir, Ahbdurrahman, and Borjas, George J. 2007. Cross-Country Variation in the Impact of International Migration: Canada, Mexico, and the United States. *Journal of the European Economic Association*, 5(4): 663-708.

Batalova, Jeanne, Fix, Michael, and Creticos, Peter A. 2008. Uneven Progress: The Employment Pathways of Skilled Immigrants in the United States. Washington, DC: Migration Policy Institute, National Center on Immigrant Integration Policy.

Borjas, George J. 2006. Native Internal Migration and the Labor Market Impact of Immigration. *Journal of Human Resources*, 41: 221-258.

Borjas, George J., Freeman, Richard B., and Katz, Lawrence F. 1997. How Much Do Immigration and Trade Affect Labor Market Outcomes? *Brookings Papers on Economic Activity*, 1: 1-67.

Boyd, Monica, and Thomas, Derrick. 2002. Skilled Immigrant Labor: Country of Origin and the Occupational Locations of Male Engineers. *Canadian Studies in Population, Special Issue on Migration and Globalization*, 29(1): 71-99.

Camarota, S. 2005. Immigrants at Mid-Decade: A Snapshot of America's Foreign Born in 2005. Center for Immigration Studies. (**http://www.cis.org,** accessed December 12, 2005).
Cortes, Patricia. 2005. The Effect of Low-Skilled Immigration on U.S. Prices: Evidence from CPI Data. Working Paper, Massachusetts Institute of Technology.

Card, D.. 2001. Immigrant Inflows, Native Outflows, and the Local Market Impacts of Higher Immigration. *Journal of Labor Economics*, 19(10): 22-64.

Card, D. 2005. Is the New Immigration Really So Bad? *The Economic Journal*, 115(507): F300-F323.

Clogg, Clifford C., and Shockey, James W. 1984. Mismatch between Occupation and Schooling: A Prevalence Measure, Recent Trends, and Demographic Analysis. *Demography*, 21: 235-257.

Cornelius, Wayne A., and Espenshade, Thomas J. 2001. The International Migration of the Highly Skilled: "High-Tech *Braceros*" in the Global Labor Market. Pp. 3-19 in Cornelius, W. A., Espenshade, T. J., amd Salehyan, I. (eds.), *The International Migration of the Highly Skilled: Demand, Supply, and Development Consequences in Sending and Receiving Countries*. San Diego, CA: University of California, Center for Comparative Immigration Studies.

De Jong, Gordon F., and Madamba, Anna B. 2001. A Double Disadvantage? Minority Group, Immigrant Status, and Underemployment in the United States. *Social Science Quarterly*, 82(1): 117-130.

Filer, R. 1992. "The Impact of Immigrant Arrivals on Migratory Patterns of Native Workers." In Borjas, G., and Freeman, R. (eds.), *Immigration and the Work force: Economic Consequences for the United States and Source Areas.* Chicago: University of Chicago Press, pp. 245-270.

Frey, William. 1995. Immigration Impacts on Internal Migration of the Poor: 1990 Census Evidence for U.S. States. *International Journal of Population Geography*, 1: 51-67.

Friedberg. R. M., and Hunt, J. 1995. "The Impact of Immigrants on Host Country Wages, Employment and Growth." *The Journal of Economic Perspectives*, 9(2): 23-44.

Hall, Matthew S, Graefe, Deborah R , De Jong, Gordon F., and Irving, Shelley K. 2009. Immigrant Population Change and Skill Profiles in 21st Century Gateways: A Human Capital-based Typology of Metropolitan Destinations, 2000-2007. Unpublished manuscript presented at the Session on Linking Internal and International Migration, 2009 Annual Meeting of the Population Association of America, May 1, Detroit, MI.

Jaeger, David. 1996. Skill Differences and the Effect of Immigrants on the Wages of Natives. Working Paper, U.S. Bureau of Labor Statistics.

Kandel, W. and Cromartie, J. 2004. "New Patterns of Hispanic Settlement in Rural America." *Rural Development and Research Report 99*. Washington, DC: Economic Research Service, U.S. Department of Agriculture.

Kandel, W. and Parrado, E. 2005. "Restructuring of the U.S. Meat Processing Industry and New Hispanic Migrant Destinations." *Population and Development Review*, 31(3): 447-471.

Liaw, K.-L., and Frey, W. H. 2009. "Choices of Metropolitan Destinations by the 1995-2000 New Immigrants Born in Mexico and India: Characterization and Multivariate Explanation." *Population Studies Center Research Report 09-687*. Ann Arbor, MI: University of Michigan, Institute for Social Research.

Lofstrom, Magnus. 2000. Self-employment and Earnings among High-skilled Immigrants in the United States. Institute for the Study of Labor (IZA) Discussion Paper No. 175. Bonn, Germany: IZA.

Longhi, S., Nijkamp, P., and Poot, J. 2005. A meta-analytic Assessment of the Effect of Immigration on Wages. *Journal of Economic Surveys*, 19(3): 451-477.

Longhi, Simonetta, Nijkamp, Peter, and Poot, Jacques. 2008. The Impact of Immigration on the Employment of Natives in Regional Labour Markets: A Meta-analysis. Pp. 173-193 in Poot, J., Waldorf, B., and van Wissen (eds.), *Migration and Human Capital*. Northampton, MA: Edward Elgar.

Martin, P. and Midgley, E. 2003. Immigration: Shaping and Reshaping America. *Population Bulletin*, Vol. 58, No. 2 (Washington, DC: Population Reference Bureau).

Ottaviano, Gianmarco I. P., and Peri, Giovanni. 2006. Rethinking the Gains from Immigration: Theory and Evidence from the U.S. Working paper, University of California, Davis.

Papademetriou, Demetrios G., Meissner, Doris, Rosenblum, Marc R., and Sumption, Madeleine. 2009. Aligning Temporary Immigration Misas with US Labor Market Needs: The Case for a New System of Provisional Visas. Washington, DC: Migration Policy Institute.

Parrado, E. and Kandel, W. 2008. "New Hispanic Migrant Destinations: A Tale of Two Industries," in Massey, D. S. (ed.) *New Faces in New Places: the Changing Geography of American Immigration*, pp. 99-123. New York: Russell Sage Foundation.

Passel, J. S., and Zimmerman, W. 2001. "Are Immigrants Leaving California? Settlement Patterns of Immigrants in the Late 1990s." *Research Report, Pub ID#410287*. Washington, DC: The Urban Institute.

Piore, M. J. 1979. *Birds of Passage: Migrant Labor and Industrial Societies.* Cambridge: Cambridge University Press.

Rosenblum, Marc. 2001. High-skilled Immigration and the U.S. National Interest. Pp. 373-400 in Cornelius, W. A., Espenshade, T. J., amd Salehyan, I. (eds.), *The International Migration of the Highly Skilled: Demand, Supply, and Development Consequences in Sending and Receiving Countries*. San Diego, CA: University of California, Center for Comparative Immigration Studies.

Ruhs, M. 2002. "Temporary Foreign Worker Programmes: Policies, Adverse Consequences, and the Need to Make Them Work." *Center for Comparative Immigration Studies Working Paper 56*. San Diego: University of California.

Singer, A. 2004. "The Rise of New Immigrant Gateways." (The Living Cities Census Series.) Washington, DC: The Brookings Institution, Center on Urban and Metropolitan Policy.

Singer, J. D. 1998. "Using SAS PROC MIXED to Fit Multilevel Models, Hierarchical Models, and Individual Growth Models." *Journal of Educational and Behavioral Statistics*, 23(4): 323-355.

Stephan, Paula E., and Levin, Sharon G. 2001. Exceptional Contributions to US Science by the Foreign-born and Foreign-educated. *Population Research and Policy Review*, 20(1-2): 59-79.

US Census Bureau. 2004. The Foreign-born Population in the United States: 2003. *Current Population Reports* P20-551.