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Country of Origin and Immigrant Earnings: Evidence from 1960-1990

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Department of Economics
Working Paper Number 131

March 2013

COLLEGE OF WILLIAM AND MARY
DEPARTMENT OF ECONOMICS
WORKING PAPER # 131
March 2013

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Abstract

Using 1960-1990 census microdata, this paper presents two analyses that examine how the initial large differences in immigrant earnings by country of origin change with duration in the United States. The first analysis reveals that country of origin adds less to the explanation of earnings among adult male immigrants the longer they reside in the United States. A second complementary analysis reveals a decrease with time in the United States in the earnings dispersion of demographically comparable immigrants across countries of origin. Both results imply convergence in immigrant earnings by country of origin.

We further test the sensitivity of these results to emigration bias—a potentially important, though generally ignored problem in studies of immigrant earnings growth. A theoretical analysis assesses the impact of hypothetical patterns of selective emigration on the two convergence results. We then introduce a technique that could be generally applied as an empirical test for emigration bias in immigrant studies. Both the theoretical and empirical analyses suggest that immigrant earnings convergence by country of origin is not an artifact of emigration.

JEL Codes: J61, J24, F22, J1

Keywords: immigration, emigration, human capital investment, skill transferability, assimilation

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Country of Origin and Immigrant Earnings

I. Introduction

Studies of immigrant earnings have found country of origin and country-of-origin characteristics to be important determinants of immigrant earnings adjusting for education, experience, and years since migration.[1] In their study aptly titled, "What's in a Name? Country-of-Origin Influences on the Earnings of Immigrants in the United States," Jasso and Rosenzweig (1986, p. 75) comment: "Studies that have described immigrant cohorts, assessed the progress of immigrants in the United States, and examined the role of ethnicity in labor market behavior have assigned to country of origin a prominent part." Their analysis identified origin-country attractiveness, economic conditions, and costs of migration as critical factors in country-of-origin's effect on immigrant earnings. Chiswick (1979, 1978), the first to theoretically and empirically examine the role of country of origin in immigrant economic assimilation, proposed a number of hypotheses relating country of origin to immigrant economic success, including the degree to which home-country skills transfer to the U.S. labor market and the selectivity of immigrants, with economic migrants being more favorably selected for economic success than refugees and non-economic immigrants. Borjas (1987) highlighted the potential role of a country's income distribution, postulating that immigrants from countries with greater income inequality than the United States will be selected from the lower tail of their countries' ability distributions and thus do poorly in the United States, whereas immigrants from countries with less

[1]The role of country of origin has been explored in many contexts including its effect on English proficiency (e.g. Chiswick and Miller, 1992 and Rivera-Batiz, 1992), immigrant unemployment and union membership (DeFreitas, 1991; 1993), immigrant networks and businesses (Bailey 1987; Waldinger 1986), native/immigrant and recent/earlier immigrant labor market competition (e.g. Rivera-Batiz and Sechzer, 1991, Gang and Rivera-Batiz, 1994a, and Enchautegui, 1994), natives' attitudes towards immigrants (Gang and Rivera-Batiz, 1994b), remittances (Simon, 1989), and in studies of immigrants in other countries (e.g. Pischke 1992 and Green 1999).

income inequality than the U.S. will be selected from the upper tail.[2]

With the dramatic change in source-country composition of U.S. immigrants, from primarily European to primarily Asian and Hispanic, interest in country-of-origin's effect on immigrant earnings has intensified, particularly since the source-country shift has been accompanied by a steep decline in immigrant entry earnings. Using decennial census data, Borjas (1992b, table 1.4, p. 25) found that the 1980 earnings of immigrant men who entered the United States between 1975 and 1980 were nearly 30% below U.S. natives' earnings. Adjusting for native/immigrant differences in age and schooling only reduced this differential to 22%, whereas weighting the 1980 earnings of recent immigrants by the pre-1965 country-of-origin mix of immigrants nearly eliminated the adjusted wage differential (Borjas, 1992b, table 1.10, p. 37). The change in U.S. immigrant source-country composition has thus been identified as a major cause of the decline in the adjusted entry earnings of U.S. immigrants.

The focus of our study is to determine how country-of-origin earnings effects change as immigrant men live in the United States. Evidently, the importance of large initial earnings differences associated with country of origin is less if such differences wane with time in the United States. Section II discusses why, theoretically, we might expect county-of-origin earnings effects to diminish. Section III tests this hypothesis with two complementary cohort analyses that examine how the importance of country-of-origin changes with immigrant time in the United States.

There are methodological issues that distinguish this study from other multivariate cohort

[2]"If the worker originates in a country that offers relatively low returns to their skills, as is common in countries with relatively egalitarian income distributions... the source country in effect 'taxes' able workers and 'insures' the least productive against poor labor market outcomes. This situation... obviously generates incentives for the most able to migrate to the United States and the immigrant flow is positively selected.... Conversely, if the source country offers relatively high rates of return to skills (which is typically true in countries with substantial income inequality)... the United States now taxes the most able and subsidizes the least productive. Economic conditions in the U.S. relative to those in the country of origin become a magnet for individuals with relatively low earnings capacities, and the immigrant flow is negatively selected." Borjas, 1992a, p. 429.

analyses. Typically, a variant of the following model is estimated on censuses that are pooled: log $y_i = X'\beta + \gamma' C_{jk} + \alpha' YSM + \varepsilon_i$ where y_i denotes the earnings of immigrant i ; X is a vector of variables measuring education and experience, and ß the corresponding coefficients; YSM measures years since migration; and C_{jk} is a set of dummy variables representing the cohort for each source country j and year-of-immigration category, k. Yet if immigrants with lower initial earnings than earlier cohorts (controlling for education and age) have greater earnings growth and vice versa, the use of dummy variables to capture cohort effects will underestimate earnings growth for cohorts with relatively low entry earnings and overestimate earnings growth for cohorts with relatively high entry earnings; any convergence that occurs across source-country groups will be underestimated.[3] In the following analyses each immigrant cohort is separately analyzed so that no relationship is assumed between the earnings growth of a cohort and its predecessor.

Sample selection also distinguishes this study. Immigrant regression models that pool entry cohorts from two or more censuses typically limit the sample to employed individuals and exclude the self-employed.[4] However, individuals who are unemployed or out of the labor force during the first census, perhaps because of low employability or time spent in school, may be fully employed during the second; individuals eligible for the sample in the first census through employment with a firm may be ineligible for the sample in the second census due to movement

[3]Methodologically, a systematic relationship between entry earnings and earnings growth implies that in studies that pool cross-sections, immigrant cohorts must be separately analyzed or the analyst must allow for an interaction between the earnings growth rate and the cohort. One approach is to include in the model factors that are believed to affect immigrant earnings and allow these factors to affect not only immigrant entry earnings but earnings growth (e.g. Duleep and Regets, 1996a, 1996b). Another approach is to estimate the entry earnings/earnings growth relationship, and incorporate it into models of immigrant earnings (Duleep and Regets, 1992, 1994, 1996).

[4]This is, of course, standard professional practice for labor economists estimating the rate of return to education and experience from Mincer earnings functions. Excluding the self-employed, for example, has a practical econometric tradeoff; to the extent that the self-employed have different unmeasured characteristics, excluding them introduces a sample selection bias, but also removes returns to physical and financial capital from reported earnings. This is usually, but not always, an appropriate tradeoff.

into self-employment. Thus the typical sample selection rules make the two census samples unrepresentative of each other and unrepresentative of the same cohort at two points in time. Though relevant to any cohort followed between censuses, this issue is particularly important in immigrant studies (and may lead to underestimates of immigrant earnings growth) since immigrants have high occupational mobility, high in-school rates, and high rates of movement into self-employment.[5] In both analyses, we include the self-employed, and in the second analysis we include all individuals irrespective of labor force status.

Our research is also distinguished by exploring, in Section IV, the potential effects of emigration on our results. Emigration plagues any cohort or cross-sectional analysis of immigrant behavior. In our case, the appearance of immigrant earnings convergence could reflect intergroup differences in emigration. We first test theoretically how potential patterns of emigration would affect the results of Section III, taking advantage of the differential relationship that exists between hypothetical emigration patterns and our two analyses of earnings convergence. We then examine emigration bias empirically, re-estimating the two earnings convergence analyses on samples of high- and low-emigration countries. The paper's final section summarizes our findings and examines whether the convergence results of Section III hold for another, more recent immigrant cohort.

II. Theoretical Expectations

Whether country-of-origin influences increase, decrease, or stay constant with time in the United States depends upon their underlying causes. If they primarily reflect intergroup differences in immigrant skill transferability, as opposed to immigrant ability, then earnings differences should narrow. Low-skill-transferability immigrants—immigrants whose

[5]For occupational mobility, see in particular Green (1999), but also Duleep, Regets, Sanders, and Wunnava (2013) and Duleep and Regets (1999). For educational investment, see Duleep and Regets (1999) and Duleep, Regets, Sanders, and Wunnava (2013).

source-country skills initially transfer poorly to the U.S. labor market and who thus have lower initial earnings—will have higher earnings growth, than high-skill-transferability immigrants, since their return to human capital investment is higher and their cost of investment lower.

The return to human capital investment is higher for immigrants than for natives because, beyond the normal return on human capital investment, immigrants face an additional return as newly acquired host-country skills permit them to bring to the U.S., or other host-country labor market, previously unvalued source-country skills (Chiswick, 1978, 1989; Mincer and Ofek, 1982).[6] It follows that, holding level of source-country human capital constant, low-skill-transferability immigrants face a higher return to host-country human capital investment than high-skill-transferability immigrants since the former have a larger component of untransferable human capital that can be brought to life with the acquisition of host-country human capital.

The costs of investment are also lower for low-skill-transferability versus high-skill-transferability immigrants since, by virtue of lower initial wages, the opportunity costs for any type of human capital investment (regardless of the extent to which it restores source-country skills) will be lower for immigrants initially lacking U.S.-specific skills than for immigrants with more immediately transferable skills (Duleep and Regets,1992, 1994, 1997a). If none of the source-country human capital that fails to transfer to the U.S. labor market were useful in the production of U.S. human capital, the lower opportunity cost of human capital investment that low-skill-transferability immigrants face would be canceled out by their higher production cost of human capital. Yet, foreign human capital that is not transferable likely increases earnings

[6]The acquisition of new host-country human capital complements the previously learned source-country human capital. The simplest example of this is the increase in opportunity to use prior skills that usually accompanies an increase in English proficiency, but can also include learning U.S. practices, technologies, or regulations in a field, or acquiring a professional license.

growth by aiding the production of U.S. human capital.[7]

Thus three principal considerations link low skill transferability to high investment in human capital, hence high rates of earnings growth, and suggest that the initial divergence in immigrant earnings by country of origin will diminish with duration in the United States. Higher rates of immigrant human capital investment will occur for immigrants with low skill transferability because: (1) the acquisition of U.S. skills will often increase the value of source-country skills in the U.S. labor market; (2) there is a lower opportunity cost of human capital investment when initial U.S. earnings opportunities are low; and (3) skills not immediately valued in the U.S. labor market may still enhance the production of U.S. human capital.[8] Family and community factors may further contribute to the link between low skill transferability and high investment in human capital.[9]

Other theoretical considerations, however, make the weakening of country-of-origin effects with years since arrival ex-ante ambiguous. If country-of-origin effects primarily reflect the selection of more or less able individuals, as in Borjas' model of immigrant selectivity, then such influences will persist or even grow in importance with time in the United States since low

[7]Although the technologies in producing goods and services differ across countries, particularly between developed and less developed countries, the processes (the materials and ultimate aims) are analogous: skills acquired in a less developed source country are useful for learning skills in a more developed destination country. More generally, persons who have learned one set of skills have advantages in learning a new set. This point is further discussed in Duleep and Regets (1997a, 1999).

[8]Duleep and Regets (1996, 1997a, 1999, 2002) present a model that combines and formalizes these concepts. We stress, to avoid any confusion, that the model predicts an inverse relationship between immigrant entry earnings and earnings growth *conditional on human capital*. Controlling for education and age, Duleep and Regets (e.g. 2002) estimate a strong negative relationship between immigrant entry earnings and earnings growth.

[9]Duleep and Sanders (1993), Baker and Benjamin (1997), and Duleep, Regets, Sanders, and Wunnava (2013) find evidence of married immigrant women helping to finance the human capital investment of husbands with low skill transferability. Bailey (1987), Gallo and Bailey (1996), Kim and Hurh (1996), and Waldinger (1986) among others present case-study evidence and Duleep and Regets (1996a) present general statistical evidence of immigrant communities creating information networks, employment, and entrepreneurial opportunities that might not otherwise exist for those with poor language skills and no U.S. experience.

(high) ability would likely dampen (increase) earnings growth;[10] individual ability affects both the workplace productivity associated with a given level of human capital and an individual's ability to gain new human capital.

Conclusive empirical evidence has, to date, been lacking. Chiswick (1978, 1979) found country-of-origin earnings convergence in cross-sectional results of lower initial earnings but higher earnings growth for immigrants from non-English-speaking countries compared with immigrants from English-speaking countries (Chiswick, 1978, 1979). However, as introduced and explored by Chiswick (1980), and analytically developed by Borjas (1985), cross-sectional estimates of immigrant earnings growth may reflect intercohort changes in unmeasured immigrant quality. A spurious convergence result would occur if country-of-origin groups with currently low entry earnings had experienced an intercohort decline in entry earnings (adjusting for observable characteristics) while country-of-origin groups with currently high adjusted entry earnings had experienced an intercohort increase in entry earnings.[11] Indeed, Borjas (1987) found evidence of such differential patterns.[12]

Following cohorts of immigrants is an apparent solution to cross-sectional bias.[13] We pursue two complementary cohort analyses that test three empirical implications of the skill-transferability explanation for country-of-origin differences in immigrant earnings: (1)

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[10]In addition, as immigrants spend time in the United States, their different individual success rates would increase within-country variance in earnings. This, in and of itself, would lead to an increase with U.S. residence in the importance of country of origin as a determinant of immigrant earnings.

[11]Such within-source-country changes could result from relaxations of immigration restrictions, the post-1965 emphasis on family admissions, and over time changes in the economic development of source countries relative to the United States.

[12]Borjas (1987, pp. 550 and 544) writes". . . the quality of immigrants admitted to the U.S. has been increasing over time when the immigrants originate in Western Europe and has been declining over time when the immigrants originate in the less developed countries.... For example, the most recent immigrant wave from the United Kingdom has an earnings potential that is about 13 percent higher than the wave that arrived in 1955, while the most recent immigrants from India have 28 percent lower earnings than the earlier cohort." We also find substantial intercohort changes in the adjusted entry earnings of immigrants from the same source country (Duleep, Regets, and Sanders, 1999).

[13]This is true keeping in mind that cohort effects may not be fully captured with dummy variables; Duleep and Regets (e.g. 1992, 1994, 2002) show that, conditional on education and age, immigrant earnings growth is inversely associated with entry earnings.

earnings-related characteristics other than country of origin, such as years of schooling and experience, should become better predictors of immigrant earnings with time in the United States as U.S.-specific skills acquired by immigrants lacking such skills enable them to obtain earnings consistent with their human capital; (2) the importance of country of origin as a determinant of immigrant earnings should fade with residence in the United States; and (3) the earnings of demographically comparable immigrants, regardless of origin, should converge over time. The first analysis examines the relationship between the importance of country of origin, as a determinant of immigrant earnings, and immigrant time in the United States. The second analysis examines whether the dispersion of earnings of demographically comparable immigrants, across different countries of origin, decreases over time.

III. The Importance of Country of Origin as a Determinant of Immigrant Earnings

Measuring the Explanatory Value of Country of Origin at Entry and Ten Years Later

The skills transferability explanation for intergroup differences in the initial education- and age-adjusted earnings of immigrants predicts that as immigrants lacking U.S.-specific skills invest in U.S. human capital, the importance of country of origin as a determinant of immigrant earnings will fade while the importance of other earnings-related characteristics will increase as all immigrants approach their earnings potential consistent with their years of schooling and experience. To determine how the importance of country of origin as a determinant of immigrant earnings changes with immigrant time in the United States, we estimated two log earnings regressions, shown below, for various immigrant entry cohorts using the Public Use Micro Samples (PUMS) from the 1960, 1970, and 1980 censuses.[14]

[14]We used the 1980 5% "A" PUMS, the 1970 1% State PUMS based on the 5% questionnaire, and the 1960 1% PUMS (Bureau of the Census, 1983, 1977, and 1975). The 1960 census did not collect year-of-immigration information; place of residence in 1955 permits us to identify immigrants who entered

The first earnings regression—the basic human capital model—includes years of schooling, years of work experience, and experience squared as regressors.[15] This earnings function was purposely kept sparse to allow other differences in productivity to be captured by country-of-origin variables in a second model, which added to the base set of regressors a set of dummy variables denoting an individual immigrant's country or region of origin, both alone and interacted with the education and experience variables. Including interactions with education and experience allows country of origin to add explanatory power through country-of-origin differences in the value of education and experience, as well as through differences in the regression intercept.

human capital model: $\log y_{it} = \alpha + \beta_1 Ed_{it} + \beta_2 Exp_{it} + \beta_3 Exp^2_{it} + \varepsilon_{it}$

human capital model with country-of-origin variables:

$$\log y_{it} = \alpha + \beta_1 Ed_{it} + \beta_2 Exp_{it} + \beta_3 Exp^2_{it} + \gamma_1 G_i + \gamma_2 G_i \cdot Ed_{it} + \gamma_3 G_i \cdot Exp_{it} + \gamma_4 G_i \cdot Exp^2_{it} + \varepsilon_{it}$$

where y_{it} = the earnings of individual i in year t; Ed = years of schooling; Exp = age minus years of schooling minus 6; and G_{ji} = a categorical variable denoting the source country j (or country-group j) of immigrant i .

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the U.S. between 1955 and 1960.

[15]We limit our focus to annual earnings. No information is provided in any census on wages per se. Although information on hours and weeks worked is available in the 1980 census, this information is only recorded in broad brackets in the 1960 and 1970 censuses.

The above pair of earnings regressions was first estimated for a cohort of immigrant men, aged 25-54, who had only been in the United States 0-5 years. (The cohort that had entered the United States during the 5 years prior to a decennial census.) Using the subsequent decennial census, we estimated the same pair of earnings equations, for the same cohort, 10 years later and aged 35-64. We could thus compare for each cohort the extent to which adding country of origin increased the explanatory value of the earnings regression at time of entry and 10 years later, as measured by R-squared.

The results from this analysis following the 1955-59 and 1965-69 cohorts are shown in Table 1.[16] We see for each cohort that the R^2 for the base regression increases with the passage of ten years. Since we limit our sample for each regression to those who entered the United States during the same 5 year period, but whose ages span 30 years, most of the variation in experience in the sample occurs before migration. Since we start with 25-year-olds, much of the variation in education reflects education outside of the United States.[17] The same holds true for the ten-year-after regressions: although individuals now may have substantial U.S. experience, there is little additional variation in the amount of U.S. experience in the sample. Thus the R^2 for the base model primarily measures the explanatory power of country-of-origin human capital; its increase over time is consistent with our hypothesis of an increase in the value of country-of-origin human capital over time, as it both complements and aids in the acquisition of new U.S. skills.

Country-of-origin effects over time can be seen more directly from the fourth and fifth columns where both the absolute and relative gain in R^2 from adding country of origin is dramatically smaller ten years after our initial observations for each cohort.[18] This suggests that

[16]Full regression results are available from the authors.
[17]We use the term "much" but not "all" advisedly: among persons 25 years old and older, Duleep and Regets (1999) and Duleep, Regets, Sanders, and Wunnava (2013) find higher rates of school attendance for recent immigrants than for natives, and for low-skill-transferability immigrants than for high-skill-transferability immigrants.
[18]For both the 1955-59 and 1965-69 cohorts, the reduction in explanatory power of the country-of-origin

the importance of country of origin as a determinant of immigrant earnings for a given cohort decreases with immigrant time in the United States.

Yet, quite apart from our hypothesis of immigrant earnings convergence, unexplained earnings variation will change over the life cycle, and in different economic environments. Since the early 1970's there has been increased earnings dispersion due to differences in the return to observed (and, it is often theorized, unobserved[19]) human capital. In addition younger workers' observed earnings (as opposed to potential earnings) will vary in part due to greater variation in the proportion of earnings foregone due to human capital investment, while older workers' earnings will vary in part due to greater variation in the stock of human capital. To what extent do the changes in R^2 for each cohort reflect an immigrant phenomenon conforming to the skills transferability hypothesis versus the change in age range from the first to the second period, or the over time change in the earnings distribution? The sensitivity of our analyses to these life-cycle and period effects may be partially tested by examining the changes in R^2 that occur following a cohort of U.S.-born men.[20]

Table 1a shows little change in the explanatory power of the basic human capital model for native male cohorts followed between 1960 and 1970, and between 1970 and 1980. Going from 1960 to 1970, R^2 rose for natives, but by a much smaller amount than for recent immigrants (Table 1). Going from 1970 to 1980, the base model R^2 for natives fell slightly, while the base model R^2 for recent immigrants more than doubled. Consistent with initial differences in skill transferability, the initial base-model R^2 for recent immigrants is lower than for natives in both 1960 and 1970. Ten years later, it is somewhat greater for immigrants than for natives in both periods.

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variables with time in the United States is statistically significant.

[19]See Juhn et.al. (1993)

[20]It is not, of course, possible to use country-of-origin dummies with natives.

Measuring Earnings Dispersion at Entry and Ten Years Later

We also test whether the earnings differences of demographically comparable immigrants by country of origin narrow with years since migration. To do this, we examined the degree of dispersion in the median earnings of immigrant men by country of origin within age/education cells for cohorts that had entered the United States during the five years prior to a decennial census, and again ten years later. Median earnings were measured within education and age subsets for 27 countries, cell sample sizes permitting.[21] We chose the coefficient of variation, defined in this case as $\sigma/|\bar{x}_{med}|$ (the standard deviation of the distribution of median earnings divided by the mean of the distribution of median earnings) as our measure of dispersion since this measures dispersion in relation to mean earnings, which grew substantially in both real and nominal terms over the 1960's and 1970's.[22] All 8 cohort comparisons, shown in Table 2, reveal important reductions in the coefficient of variation (CV) after ten years:[23] within age and education groups, the across-source-country earnings variation declines by 13 to 55 percent.

As with the previous analysis using R^2, we explore the sensitivity of this analysis to intra-cohort changes in age distribution and census-year earnings distributions by following an age

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[21]Sample size concerns led us to group many countries, and to group age and education each into two categories. Also, any estimate of median earnings based on a sample size of less than 5 individuals was dropped. The education categories are 1-12 years and 13 or more years. The age categories are 25-39 and 40-54 for entry cohorts on the 1960 and 1970 PUMS, and 35-49 and 50-64 for the same cohorts ten years later on the 1970 and 1980 PUMS. The source-country/region selection is kept constant across all of the analyses, including the analyses shown in Tables 6 and 7, so that the results are not affected by changes in how the source countries/regions were defined. We also did a number of sensitivity tests and found very similar results regardless of how the source country/regions were defined. The source countries/regions used in the analyses are: Africa, Britain, Canada, China/Taiwan, Cuba, Czechoslovakia, Germany, Greece, Hungary, India, Ireland, Islamic Southwest Asia, Italy, Jamaica, Japan, Korea, Mexico, Oceania, Other Asia, Other Central America, Other Communist Europe, Other Non-Communist Europe, Philippines, Poland, Portugal, South America, and Yugoslavia. Census-based codes to create the multi-country groups are available from the authors.

[22]Estimates of standard errors for our estimates of the coefficient of variation follow Kakwani (1990) in which the standard error of a coefficient of variation on a variable X is given by: $\sigma_{cv} = ((M^2(M_4 - M_2^2) + 4 M_2(M_2^2 - (M M_3))) / (16 M^4 (M_2 - M^2)))^{0.5}$ where M is the mean of X, M_2 is the mean of X^2, M_3 is the mean of X^3, and M_4 is the mean of X^4. In computing the coefficient of variation, each median earnings observation was weighted by the number of individuals in the age/education/country-of-origin category in the starting period.

[23]The reductions in the coefficient of variation with time in the U.S. are statistically significant.

cohort of U.S.-born men between the 1960 and 1970 censuses, and between the 1970 and 1980 censuses. The coefficient of variation in earnings for U.S. natives[24] is shown in Table 2a for the four age/education cells used in Table 2. While the CV of earnings for recent immigrants declined over time in each case, it increased in most cases for native males. The major exceptions are the group of younger, high-education natives, whose earnings CV shows large declines in both periods, and the group of older, high-education natives in the 1960-1970 period, who experienced a small decline. Yet, even in those cases, the percentage decline in the earnings CV for immigrants greatly exceeds that for natives.

IV. Emigration Bias and the Decline in the Importance of Country of Origin

Since our findings are based on analyses that follow samples of individuals, across decennial censuses, rather than the same individuals, careful thought must be given to potential biases caused by immigrants leaving the United States.[25] The country-of-origin earnings convergence may simply reflect selective emigration systematically related to the U.S. earnings of immigrants.

The type of selection bias of earnings growth caused by emigration is not a well settled issue in the immigration literature.[26] Some evidence suggests that it is the less successful, relative to immigrants with the same age, education and country of origin, who are most likely to emigrate.[27] Vanderkamp (1972, p. 465) provides indirect evidence that return migrants may "have

[24]The coefficient of variation in individual earnings is a slightly different concept than that of the CV of median earnings of country-of-origin groups. This alternative measure was used since native males could not be grouped by source country. Although individual earnings show greater total variation, our focus is on how this variation changes over time as a cohort ages, and between time periods.

[25]This is particularly important as a third of immigrants may emigrate (Warren and Kraly, 1985; Warren and Peck, 1980) and emigration patterns are unlikely to be random. Ahmed and Robinson (1994), Duleep (1994), and Lalonde and Topel (1997) review emigration studies and discuss determinants of emigration.

[26]DaVanzo (1976) and DaVanzo and Morrison (1981) suggest that return and nonreturn migrants differ in their characteristics and responses to factors associated with migration decisions.

[27]Yezer and Thurston (1976, p.702) proposed this theory in a study of U.S. migration.

experienced a negative return on their mobility investment" and DaVanzo (1983) finds that emigrants who return promptly are less successful than those who stay, or who stay longer.[28] Such findings imply that earnings growth estimates based on following immigrant cohorts are biased upwards, since lower earning individuals would not be in the sample for later censuses.

Other studies suggest the reverse. In a cross-sectional analysis of Mexican immigrants comparing wage regressions estimated on samples including and excluding emigrants, Lindstrom and Massey (1994) conclude that the strong positive relationship between immigrant experience and wages is not an artifact of selective emigration. Chiswick also failed to find evidence that, controlling for education, the unsuccessful are more likely to emigrate in that the cross-sectional partial effect of years since migration on earnings by country of origin is not positively related to the rate of emigration: "If anything, re-emigration rates are higher the greater the transferability of skills and if the original migration is economic in nature" (Chiswick, 1980, p. 4A-17). Consistent with the notion that emigration is highest for those with the most transferable skills, Duleep, Regets, Sanders, and Wunnava (2013) find that investment in U.S. human capital (which they find to be inversely associated with skill transferability) is positively associated with permanence.

Another emigration-earnings relationship is suggested by Borjas and Bratsberg (1996). Following the Borjas (1987) model of immigrant selectivity, their study suggests that immigrants from countries with less equal income distributions than the United States would (controlling for education and age) tend to have relatively low U.S. earnings; within those groups, the higher the earnings ability of immigrants, the less they would benefit from living in the U.S. relative to living in their country of origin, and the more likely they would be to emigrate. Immigrants from countries with more equal income distributions than the United States would have relatively high earnings on average; within those groups, the lower the earnings ability of immigrants, the less

[28]DaVanzo (1983, p. 558) notes that "Only those migrants who return promptly...conform to the 'failure' stereotype..." Duleep (1994) models the timing of emigration and provides empirical evidence.

they would benefit from living in the U.S. relative to living in their country of origin, and the more likely they would be to emigrate.

Given this diversity of perspectives and findings, we pursue two tests—one theoretical, the other empirical—to assess the sensitivity of our convergence results to emigration, without embracing any one assumption about the nature of the emigration-earnings relationship.

A Theoretical Approach for Assessing the Impact of Emigration

Our first emigration sensitivity test takes each of the emigration models implied in the findings discussed above and theoretically evaluates its effects on our two convergence analyses presented in Part II. Potential patterns of emigration as a function of the U.S. earnings of immigrants are shown in Figure 1. The series of distributions shown in panels A and B represent hypothetical distributions of U.S. immigrant earnings from particular countries of origin with $\bar{Y}$ denoting the average earnings of immigrants across all countries of origin. The darkened areas indicate where in each country-of-origin earnings distribution emigration is most likely to occur.

In Panel A, emigration occurs most frequently in the same part of the earnings distribution for each country-of-origin immigrant group, regardless of the group's place in the overall earnings distribution. In the specific example shown, low earners in each country-of-origin immigrant group are more likely to emigrate. This model might fit particularly well if the original decision to immigrate was based in part on knowledge of how fellow countrymen with similar levels of education and experience had fared in the United States. Those in the lower end of the distribution, who did worse in the job market than they had originally expected, would be the most likely to emigrate. Such a pattern would reduce the dispersion within each country-of-origin group. As a result of emigration, the relative contribution of country of origin to explaining earnings, as measured by the change in R^2, would increase. This would lead us to underestimate in our first

convergence analysis the decline in the importance of country of origin with immigrant time in the United States.[29] But, since the propensity to emigrate is similarly distributed across all countries, this type of emigration does not pose a problem for our second convergence analysis as it affects only the within-country earnings variance, not the dispersion of median earnings across all countries.

To be thorough, consider two possible, but less theoretically appealing variations of Panel A—emigration in the center of each country-of-origin group's earning distribution and emigration of the high earners in the right tail of each group's distribution. Emigration from the right tail of each group's distribution has exactly the same effect on our two measures of convergence as emigration from the left tail: the reduction in the dispersion of earnings within each country-of-origin group will cause an overestimate of the importance of country of origin with immigrant time in the U.S., but no change in the dispersion of median earnings. Emigration from the center of each distribution, while still having no effect on the dispersion of median earnings, will increase the dispersion of earnings within each country-of-origin group. This scenario is of particular concern to our first analysis of convergence since it would lead us to underestimate the importance of country of origin with immigrant time in the United States and thus *overstate* the decline in its importance.

Panel B shows a different assumption, similar to the Borjas/Bratsberg pattern of emigration, in which the distribution of emigration within each country-of-origin group is affected by its place in the overall earnings distribution: emigration is more likely among low-earning immigrants from country-of-origin groups with high median earnings and high-earning immigrants from

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[29] In the first convergence analysis we compute $R^2_w - R^2_{wo}$ or $[1-\Sigma(y_i-\hat{y}_{iw})^2/\Sigma(y_i-\bar{y})^2] - [1-\Sigma(y_i-\hat{y}_{iwo})^2/\Sigma(y_i-\bar{y})^2]$ for entering immigrants and for the same cohort 10 years later, where $\hat{y}_{iw}$ is the predicted earnings of individual i from the equation with country of origin and $\hat{y}_{iwo}$ is the predicted earnings of individual i from the equation without country of origin. Emigration at the tails of the country-of-origin earnings distributions will cause y_i to be more closely distributed around $\hat{y}_{iw}$, relative to $\hat{y}_{iwo}$, and $R^2_w - R^2_{wo}$ to become larger; emigration at the center of the country-of-origin earnings distributions will have the reverse effect.

country-of-origin groups with low median earnings. The reverse case can also be considered in which the high earners from high-earning countries and the low earners from low-earning countries are more likely to emigrate. Both scenarios would reduce the dispersion of earnings within the country-of-origin groups. In our first convergence analysis of the change in R^2, emigration would lead us to overestimate the importance of country of origin with immigrant time in the U.S., and thereby underestimate the decline in its importance. In our second analysis, these two scenarios would have opposite effects. The Bratsberg-Borjas type of emigration increases the dispersion of median earnings leading to an underestimate of convergence. The second scenario is of greater concern since it would lead us to overestimate convergence.

The potential biases in our two convergence analyses caused by each stylized pattern of emigration are summarized in Table 3; a plus sign indicates emigration patterns that would cause us to overstate convergence. For each pattern of emigration, at least one of our two analyses measuring earnings convergence is either unaffected, or is biased in such a way to understate earnings convergence. Thus while each of our analyses could produce a spurious convergence due to emigration, none of the theoretical emigration patterns would overstate convergence in both analyses. Furthermore, the two emigration scenarios with some theoretical basis—those shown in Panel A and Panel B of Figure 1—would not lead to an overstatement of convergence in either of our two convergence analyses.

An Empirical Approach for Assessing the Impact of Emigration

Reality, of course, is often a mélange of theoretical scenarios. To empirically examine the effect of emigration bias, we re-estimated our two convergence analyses dividing the sample into high- and low-emigration source-country groups. If our findings of convergence were solely due to emigration, we should consistently find greater convergence in country-of-origin cohorts with

high emigration. Re-estimating our analyses on samples divided by emigration level also allows us to determine whether our findings of convergence persist when emigration variation is reduced. Our measure of 10-year emigration is calculated using the number of observations for each cohort on the 1960-80 decennial censuses adjusted to the 5 percent sampling proportion of the 1980 census file. Since sample sizes and census coverage changes over time make this a crude measure (Passel and Luther, 1990), we use it only to categorize the country-of-origin cohorts as having high or low emigration rates, with the median emigration rate serving as the dividing point.

Table 4 shows our findings when we re-estimate the explanatory power of country of origin over high- and low-emigration samples. For both high and low emigration country-of-origin groups, the addition of country of origin adds less to the explanatory power of the earnings regression after a cohort has been in the United States 10 years. Most importantly, the magnitude of the effects seem unrelated to high or low emigration. Estimates of the dispersion of median earnings for high and low emigration samples are shown in Table 5. Not surprisingly, there is more variability in the estimates given the decrease in the cell sample sizes after dividing the sample. Nevertheless, in all eight age/education/entry-year cohorts, the coefficient of variation decreases in the ten years between decennial censuses, and no strong pattern emerges of larger (or smaller) reductions in earnings variation for the high emigration cohorts.

V. Conclusion and More Recent Evidence

We examine how the well-documented importance of country of origin to immigrant earnings changes with time in the United States. Our first analysis reveals a decrease in the explanatory power with time in the United States of country-of-origin variables in earnings regressions estimated across individuals in specific year-of-entry immigrant cohorts. This result suggests that the importance of country of origin for explaining earnings decreases as immigrants

stay in the United States. Our second analysis reveals a decrease with time in the United States in the dispersion of individual earnings across country of origin within various age/education/year-of-entry cohorts. This result suggests that the earnings of demographically comparable immigrants, regardless of origin, tend to converge over time.

As the analyses are based on following cohort samples, emigration is a serious concern. However, theoretical emigration patterns that would cause a spurious decrease in the importance of country of origin in one analysis are the complement of the emigration patterns that would cause a spurious decrease in the other analysis. Moreover, using a technique that could be applied more generally, both results persist in an empirical test of emigration bias.

The convergence results do not appear to be the result of other processes such as labor-market-wide changes in earnings distribution between censuses or to earnings distribution changes that occur, in general, as individuals gain experience. Similar natives over the same periods do not show similar declines in earnings variation, and the importance of the basic human capital model to explain that variation does not change importantly for U.S.-born cohorts over these periods.

A remaining concern is whether the results of Part III hold for more recent U.S. immigrants, particularly given the substantial body of research concluding that there has been a pronounced decline in the unobserved quality of immigrants (e.g. Borjas 1985, 1987, 1992a, b).[30] To address this issue, we used 1980 and 1990 census data to repeat the analyses of Tables 1 and 2 for the most

[30]This conclusion assumes stationarity in earnings growth (conditioning on human capital) across year-of-entry cohorts (Borjas, 1985, 1987, 1994). We find following cohorts, however, that conditional on human capital, decreases in immigrant entry earnings are inversely associated with increases in earnings growth (e.g. Duleep and Regets 1992, 1994); higher conditional earnings growth seems incompatible with a decline in unobserved quality. Borjas (1994) questioned whether our result based on 1960-1980 data would hold with more recent data; using 1980 and 1990 census data, and *not conditioning on* human capital, he found that the most recent decrease in immigrant entry earnings was not accompanied by an increase in earnings growth. Analysis with the 1980 and 1990 census data, conditioning on education, (Duleep and Regets, 2002, 1997a) confirms the earlier Duleep-Regets result that immigrant entry earnings are negatively associated with earnings growth.

recent cohort that can be followed with decennial census data—immigrants who entered the United States between 1975 and 1980.[31]

Table 6 shows for the 1975-80 cohort the extent to which adding country of origin increases the explanatory value of the earnings regression at time of entry and 10 years later as measured by R-squared. Following our earlier framework, a pair of earnings regressions are estimated at entry, and ten years later. The first earnings regression in the pair includes as regressors level of schooling[32] and age and age squared (as proxies for years of work experience and experience squared).[33] The second earnings regression adds to the human capital model a set of dummy variables denoting an individual immigrant's country or region of origin, both alone and interacted with the education and experience variables. We find, as before, that the R^2 for the human capital regression increases with the passage of ten years, consistent with the hypothesis that schooling and experience become better predictors of immigrant earnings with time in the United States as U.S.-specific skills acquired by immigrants lacking such skills enable them to obtain earnings consistent with their source-country human capital. Concomitantly, both the absolute and relative gain in R^2 from adding country of origin is dramatically smaller ten years after our initial observations. Table 7 examines whether earnings convergence occurs across immigrant source-country groups. Confirming our previous results, all of the cohort comparisons

[31]We used the 1980 5% "A" PUMS and a 6% microdata sample created by combining and reweighting the 1990 5% and 1% PUMS (Bureau of the Census, 1983 and 1992).

[32]Although the 1980 census data have years of schooling, information on schooling achievement in the 1990 data is in categories. To maintain conformity in the explanatory variable definitions across censuses, we included five dummy variables for schooling categories in both the 1980 and 1990 earnings regressions: 9-11 years, high school degree, some college (including two-year degrees), Bachelor's degree, and graduate degree, for the 1990 census and 9-11 years, 12 years, 13-15 years, 16-17 years, and 18 years or more, for the 1980 census. The excluded variable in both specifications is eighth grade or less. Another complication is that the 1990 census definition measures successful
completion of various schooling levels whereas the 1980 definition measures years of completed schooling per se. Using a sample from the Current Population Survey with both the new and old census education questions, Jaeger (1997) found that 17 years of schooling was most consistent with completion of only a bachelor's degree.

[33]For the 1980-1990 analysis, age rather than age minus years of schooling minus 6 was used for both periods for consistency. (See the previous note on the 1980-1990 changes in education measurement.)

delineated by age and education show reductions in the coefficient of variation (CV) after ten years.

Taken as a whole, our analyses suggest that although country of origin plays a prominent role in determining the entry-level earnings of immigrants, its importance fades with time in the United States. This conclusion is consistent with a substantial body of other research that predicts or finds a negative relationship, conditional on initial immigrant education levels, between immigrant entry earnings and earnings growth (Chiswick, 1978, 1979; Duleep and Regets, 1992; 1994; 1996; 1997a, b; 1999; 2002).

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Table 1: Changes in the Explanatory Power of Country of Origin as Time in U.S. Increases
(Bootstrap standard errors for R^2 in parentheses)

Entry Cohort, Census year	R^2 for human capital model	R^2 for human capital model with country-of-origin variables	*Change in R^2 from adding country-of-origin variables*	*Percentage change in R^2 from adding country-of-origin variables*
1955-59 cohort				
At entry: 1960	.1154 (.0131)	.2758 (.0188)	.1604	139.0
Ten years later: 1970	.1606 (.0095)	.2493 (.0099)	.0887	55.2
1965-69 cohort				
At entry: 1970	.0812 (.0086)	.1731 (.0123)	.0919	113.2
Ten years later: 1980	.1663 (.0055)	.2065 (.0058)	.0402	24.2

The base model is the regression of individual log(earnings) on experience, experience squared, and education. In the second model, region/country dummies and region/country interactions with education and experience are included for Africa, Britain, Canada, China/Taiwan, Cuba, Czechoslovakia, Germany, Greece, Hungary, India, Ireland, Islamic Southwest Asia, Italy, Jamaica, Japan, Korea, Mexico, Other Asia, Oceania, Other Communist Europe, Other Non-Communist Europe, Other Central America, Philippines, Poland, Portugal, South America, and Yugoslavia.

Table 1a: Changes in the Explanatory Power of the Base Model for U.S.-Born Men

Age, Census year	R^2 for Base Model
25-54, 1960	.1317
35-64, 1970	.1475
Change in R^2	.0158
25-54, 1970	.1312
35-64, 1980	.1143
Change in R^2	-.0169

The base model is the regression of individual log(earnings) on experience, experience squared, and education.

Table 2: Changes in the Dispersion of Median Earnings Across Country-of-Origin Groups
(Coefficients of Variation in Percentages)
(Weighted by Initial Cohort Size)
(Standard Errors of CV in Parentheses)

Entry Cohort, Census year	Young Low Education	Young High Education	Old Low Education	Old High Education
1955-59 cohort				
At entry: 1960	46.6 (2.641)	37.2 (2.590)	39.0 (3.130)	39.3 (3.210)
Ten years later: 1970	21.1 (0.894)	17.5 (2.047)	24.9 (1.778)	18.3 (2.731)
Change in CV	-25.5	-19.7	-14.1	-21.0
Percentage Change in CV	-54.7	-52.9	-36.1	-53.4
1965-69 cohort				
At entry: 1970	28.9 (1.459)	34.7 (1.993)	30.6 (2.233)	39.6 (1.695)
Ten years later: 1980	25.3 (1.280)	18.4 (1.128)	24.3 (2.018)	29.5 (1.258)
Change in CV	-3.6	-16.3	-6.3	-10.1
Percentage Change in CV	-12.5	-47.0	-20.6	-25.5

Young: Aged 25-39 in the year of the first Census used in the comparison.
Old: Aged 40-54 in the year of the first Census used in the comparison.
Low Education: 1-12 years of schooling
High Education: greater than 12 years

Table 2a: Changes in the Dispersion of Individual Earnings
U.S. -Born Men
(Coefficients of Variation in Percentages)

Age, Census year	Young Low Education	Young High Education	Old Low Education	Old High Education
25-54, 1960	63.5	81.5	73.6	71.7
35-64, 1970	68.7	64.9	83.9	71.3
Change in CV	5.2	-16.6	10.3	-0.4
Percentage Change in CV	8.2	-20.4	14.0	-.6
25-54, 1970	60.7	72.3	72.2	66.2
35-64, 1980	73.2	63.7	96.5	73.8
Change in CV	12.5	-8.6	24.3	7.6
Percentage Change in CV	20.6	-11.9	33.7	11.5

Young: aged 25-39 in the year of the first Census used in the comparison.
Old: aged 40-54 in the year of the first Census used in the comparison.
Low Education: 1-12 years of schooling
High Education: greater than 12 years

Table 3: Predicted Emigration Biases on Measures of Earnings Convergence Among Country-of-Origin Groups

	Analysis	
Pattern of Emigration	Addition to R^2 Adding Country-of-Origin Variables	Dispersion of Median Earnings
Left or right tail of each country-of-origin earnings distribution. (The unsuccessful, or the successful, of each country-of-origin group emigrate.)	-	NO BIAS
Center of each country-of-origin earnings distribution.	+	NO BIAS
Right tail of the earnings distribution for low-earning country-of-origin groups and left tail of the earnings distribution for high-earning country-of-origin groups. (Borjas-Bratsberg hypothesized pattern of emigration.)	-	-
Right tail of the earnings distribution for high-earning country-of-origin groups and left tail of the earnings distribution for low-earning country-of-origin groups.	-	+

+ indicates that emigration bias works to overstate country-of-origin convergence.
- indicates that emigration bias works to understate country-of-origin convergence.

Table 4: Change in the Explanatory Power of Country of Origin: High and Low Emigration Country-of-Origin Groups
(Bootstrap standard errors of R^2 in parentheses)

	LOW EMIGRATION				HIGH EMIGRATION			
Entry Cohort, Census Year	R^2 for human capital model	R^2 for human capital model with country-of-origin variables	*Change in R^2 from adding country-of-origin variables*	*Percentage change in R^2 from adding country-of-origin variables*	R^2 for human capital model	R^2 for human capital model with country-of-origin variables	*Change in R^2 from adding country-of-origin variables*	*Percentage change in R^2 from adding country-of-origin variables*
1955-59 cohort								
At entry: 1960	.1108 (.0176)	.2458 (.0231)	.1283	109.2	.0620 (.0141)	.2460 (.0351)	.1840	296.7
Ten years later: 1970	.1109 (.0184)	.2061 (.0261)	.0952	85.8	.1449 (.0247)	.2111 (.0270)	.0662	45.7
1965-69 cohort								
At entry: 1970	.0265 (.0078)	.0912 (.0126)	.0647	244.1	.1151 (.0149)	.1943 (.0195)	.0792	68.8
Ten years later: 1980	.0992 (.0064)	.1250 (.0070)	.0258	26.0	.1546 (.0107)	.1914 (.0121)	.0368	23.8

Table 5: Changes in the Dispersion of Median Earnings Across Country-of-Origin Groups
Divided by High and Low Emigration
(Coefficients of Variation in Percentages)
(Standard Error of CV in Parentheses)

	Low Emigration				High Emigration			
1955-59 cohort	Young Low Education	Young High Education	Old Low Education	Old High Education	Young Low Education	Young High Education	Old Low Education	Old High Education
At entry: 1960	53.5 (3.25)	39.1 (3.99)	21.6 (3.42)	40.7 (6.02)	22.0 (4.50)	33.6 (3.68)	45.7 (5.79)	28.6 (3.83)
Ten years later: 1970	17.9 (0.99)	15.4 (1.49)	16.8 (1.30)	23.5 (4.45)	12.7 (2.95)	14.1 (3.33)	29.2 (2.78)	12.4 (1.25)
Change in CV	-35.6	-23.7	-4.8	-17.2	-9.3	-19.5	-16.5	-16.2
1965-69 cohort								
At entry: 1970	22.2 (1.89)	30.5 (2.19)	21.3 (3.57)	36.1 (6.64)	29.6 (2.92)	25.1 (1.37)	41.3 (2.74)	22.4 (2.084)
Ten years later: 1980	17.8 (1.63)	19.0 (1.25)	21.2 (3.70)	19.5 (2.33)	22.5 (1.17)	13.7 (1.31)	28.1 (2.15)	17.0 (0.98)
Change in CV	-4.4	-11.5	-0.1	-16.6	-7.1	-11.4	-13.2	-5.4

Table 6: Changes in the Explanatory Power of Country of Origin for the 1975-80 Cohort of Immigrant Men as Time in U.S. Increases
(Bootstrap standard errors for R^2 in parentheses)

Entry Cohort, Census year	R^2 for human capital model	R^2 for human capital model with country-of-origin variables	*Change in R^2 from adding country-of-origin variables*	*Percentage change in R^2 from adding country-of-origin variables*
1975-80 cohort in 1980	.0881 (.0032)	.1577 (.0042)	.0690	79.0
1975-80 cohort in 1990	.2120 (.0047)	.2519 (.0052)	.0399	18.8

Notes: The human capital model is the regression of individual log(earnings) on age, age squared, and education. In the second model, shown in the second data column, region/country dummies and region/country interactions with education and age are included.

Estimates based on the 1980 Census of Population 5 percent "A" Public Use Sample, and a 6 percent microdata sample created by combining and reweighting the 1990 Census of Population Public Use 5% and 1% Public Use samples.

Table 7: Changes in the Dispersion of Median Earnings Across Country of Origin
for the 1975-80 Cohort of Immigrant Men as Time in U.S. Increases
(Coefficients of Variation in Percentages)
(Weighted by Initial Cohort Size)
(Standard Errors of CV in Parentheses)

Entry Cohort, Census year	Young Low Education	Young High Education	Old Low Education	Old High Education
1975-79 cohort				
At entry: 1980	34.6 (.0348)	55.1 (.0343)	52.1 (.0500)	57.6 (.0182)
Ten years later: 1990	26.4 (.0187)	23.1 (.0127)	28.6 (.0190)	32.5 (.0300)
Change in CV	-8.2	-32.0	-23.5	-25.1
Percentage Change in CV	-23.7	-58.1	-45.1	-43.6

Young: Aged 25-39 in the year of the first Census used in the comparison.
Old: Aged 40-54 in the year of the first Census used in the comparison.
Low Education: 1-12 years of schooling
High Education: greater than 12 years

Figure 1

PANEL A

$\overline{Y}$

PANEL B

$\overline{Y}$