



Earnings Performance of African Immigrants: Evidence from the American Community Survey

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Abstract Although the number of African immigrants in the U.S. has increased rapidly in recent decades, relatively little regarding their economic performance and assimilation appears in the economics literature. We use pooled cross-sectional data (2011–2015) from the American Community Survey to explore the effects on African immigrant earnings of immigrant characteristics such as degrees attained, type of major, years in the U.S., citizenship status, English-speaking abilities, and country of origin. We also use earnings functions to analyze the earnings assimilation of African immigrants with natives over the past decade. The results show that college-educated African immigrants have experienced some earnings convergence with natives between 2005 and 2015. Surprisingly, the assimilation analysis of non-college graduate African immigrants shows that they have achieved an earnings advantage over native non-college graduates.

Keywords Immigration · Assimilation · Earnings · African immigration · Wage gap · Human capital

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Introduction

The African-born population in the U.S. has grown very rapidly in recent decades, with growth from about 80,000 to 2,060,000 between 1970 and 2015, and it has more than doubled since 2000 alone (Anderson 2017). The Pew Research Center (2018) reports that Sub-Saharan African immigrants in the United States have higher average educational attainment than the U.S. native-born population and that a high proportion of African immigrants are college graduates. As of 2015, African source countries with the largest number of immigrants in the U.S. are Nigeria (327 K), Ethiopia (222 K), Egypt (192 K) Ghana (155 K), Kenya (136 K) and South Africa (92 K) (Anderson 2017).

Our paper uses American Community Survey (ACS) data to analyze the determinants of African immigrant earnings from 2005 through 2015 with a focus on the effects of educational attainment, other human-capital-related variables, immigrant characteristics and country-of-origin characteristics.

Educational attainment and a number of other immigrant-specific characteristics are particularly important in determining immigrant earnings. Since immigrants from many source countries, including most African countries, experience positive selection, they have relatively high levels of educational attainment (Borjas 1985, 1987; Chiswick 1999). For example, Liao and Seeborg (2015) find that variables such as year of arrival, citizenship status and English-speaking ability are significant determinants of Chinese immigrant earnings.

Despite these advantages that stem from positive selection, immigrants face challenges when they first arrive in the U.S. However, over time they assimilate culturally. Those from non-anglophone countries master English and develop social and economic networks (Waters and Jiménez 2005; Wu and Seeborg 2012). The result of this assimilation process is a relatively rapid increase in immigrant productivity and wages.

Research on the immigrant labor market experience, therefore, suggests that there are opposing forces that affect immigrant assimilation. There is some evidence that immigrants are likely to do well because of positive selection. Duleep and Regets (1999) and Chiswick (1978), for example, argue that immigrants tend to be favorably selected from their countries of origin when the cost of initial and return migration is high. Given the distance of the U.S. from Africa, we expect positive selection to apply to most African immigrants. This positive selection should result in favorable earnings experiences in the U.S.

But just as there are reasons to expect earnings assimilation of African immigrants with U.S. natives, there are also reasons to expect an enduring wage gap. Borjas (1994), for example, found that after controlling for skills, the U.S. earnings of immigrants from 41 countries were highly dependent on the political and economic conditions of their home countries, with immigrants from less developed countries experiencing the greatest difficulties in economic assimilation. This line of reasoning suggests that relatively unfavorable conditions in some African countries could hinder the economic assimilation of African immigrants with U.S. natives.

Whether immigrants acquire human capital in the host country or in the destination country also matters. Friedberg (2000) found that human capital acquired abroad is significantly less valuable than skills acquired domestically because some skills are country specific. Those immigrants who have been in the U.S. for more years have more time to acquire unique U.S.-specific human capital and enjoy an earnings advantage from this human capital. This suggests that recent African immigrants should

initially have lower wages than natives with similar educational attainment levels and that these earnings gaps should decrease as the immigrant cohort spends more time in the U.S. and acquires U.S. specific human capital.

This paper uses the American Community Survey micro-data extracted from the Integrated Public Use Microdata Series (Ruggles et al. 2015) to analyze how individual and country-of-origin characteristics determine African immigrant earnings and assimilation. We use a pooled cross section of African immigrants from the American Community Survey (2011 through 2015) to determine the impact of immigrant characteristics on African immigrant earnings performance. Some of these characteristics are unique to the individual immigrant, such as English language proficiency, citizenship status, age at arrival, and number of years of residence in the U.S. Other characteristics are unique to the immigrant's country of origin, such as per capita gross domestic product (GDP) and colonial influences. We also conduct an assimilation analysis for college graduates and non-college graduates to see the extent that these two cohorts of African immigrants have assimilated with their native counterparts from 2005 through 2015. The simulation involves estimating wage functions for natives and then estimating what African immigrants would be earning if they had the same reward structure as the native population. The estimated immigrant earnings are then compared to actual immigrant earnings to determine the extent that earnings assimilation has occurred.

Pooled Cross-Sectional Analysis of African Immigrant Earnings

The primary data source is the American Community Survey (ACS) from the Integrated Public Use Microdata Series (Ruggles et al. 2015). We use a pooled cross section from the ACS that combines data over a five-year period (2011, 2012, 2013, 2014 and 2015) to produce a sufficiently large sample of African immigrants to analyze the impact of immigrant-specific characteristics on earnings. The pooled sample is restricted to African immigrants and natives who meet the following conditions:

- Were 25 through 65 years of age during the survey year;
- Worked an average of at least 35 hours per week during the past year;
- Worked at least 48 weeks over the past year;
- Resided in the U.S. for at least one year prior to the survey date.

We extracted data for all African immigrants who met these conditions and a 1 in 10 sample of native-born respondents who met the same conditions. Table 1 gives detailed variable definitions. The independent variables include a set of human capital measures that proxy the amount of education (*Bachelor's*, *Master's*, *Professional*, *Doctorate*), type of human capital attained (*STEM*) and experience (*Age*, *AgeSquared*). The returns to investment in advanced degree programs are important to the African immigrant population since they are more likely than natives to have advanced degrees.

We have a particular interest in the earnings of African immigrants who pursue degrees in science, technology, engineering and mathematics (STEM disciplines). A limitation of the ACS data is that major disciplines of study are only measured for majors at the bachelor's level. This means that those who receive a bachelor's degree in a non-STEM discipline and an advanced degree in a STEM discipline are not counted as having a STEM discipline.

Table 1 Variable definitions for pooled regression (2011–2015)

Variable	Description
Dependent variable	
<i>LnRealwage</i>	Natural log of real annual earnings. Real earnings were computed with 2015 base year CPI.
Baseline model variables (Human capital & demographic)	
<i>HighSchoolGrad</i>	1 if high school diploma or GED is highest degree attained
<i>SomeCollege</i>	1 if some college but did not achieve bachelor's degree.
<i>Bachelor's</i>	1 if bachelor's degree is highest degree attained.
<i>Master's</i>	1 if master's degree is highest degree attained.
<i>Professional</i>	1 if professional degree (e.g. JD or MD) is the highest degree attained.
<i>Doctorate</i>	1 if doctorate degree is the highest degree attained.
<i>STEM</i>	1 if bachelors degree field is STEM* Discipline.
<i>Age</i>	Actual age of respondent at the time of the interview.
<i>AgeSquared</i>	Age squared.
<i>Female</i>	1 if female.
<i>Married</i>	1 if married.
<i>UsualHrsWork</i>	Usual hours worked during the week.
Immigrant characteristics	
<i>LimitedEnglish</i>	1 if immigrant does not speak English or does not speak English well.
<i>Citizen</i>	1 if African immigrant who obtained U.S. citizenship status.
<i>10to20Years_in_US</i>	1 if immigrated 10 to 20 years before interview.
<i>> 20Years_in_US</i>	1 if immigrated more than 20 years before interview.
Country of origin variables	
<i>Country of origin</i>	Set of seven dummy variables indicating country of origin: Nigeria, Egypt, South Africa, Ghana, Kenya, Ethiopia. Reference is all other countries of origin.
<i>LowGDP</i>	1 if immigrant country of origin has 2010 per capita GDP less than \$1,000 (Gambia, Guinea, Liberia, Senegal, Sierra Leone, Togo, Ethiopia, Kenya, Tanzania, Uganda, Zimbabwe, Eritrea, Central Africa, Zaire).
<i>BritishColony</i>	1 if country of origin occupied by British in 1914 (Egypt, Sudan, Gambia, Ghana, Nigeria, Sierra Leone, Kenya, Uganda, Zambia, Zimbabwe, South Africa).
<i>FrenchColony</i>	1 if country of origin occupied by French in 1914 (Algeria, Morocco, Senegal, Central Africa).
<i>SaharanAfrica</i>	1 if country of origin is in Saharan Africa.

*STEM disciplines include: Agriculture; Environmental and Natural Resources; Architecture; Computer and Information Sciences; Engineering; Engineering Technologies; Biology and Life Sciences; Mathematics and Statistics; Military Technologies; Physical Sciences; Nuclear, Industrial Radiology, and Biological Technologies; Psychology; Electrical and Mechanical Repairs Technologies; Precision Production and Industrial Arts; Transportation Sciences and Technologies; Medical and Health Sciences and Service

Data source: Integrated Public Use Microdata Series (IPUMS) extract from American Community Surveys: 2011–2015 (Ruggles et al. 2015)

Basic demographic determinants of earnings include measures of age, gender and marital status (*Age*, *AgeSquared*, *Female*, and *Married*). An interaction between *Female* and *Married* (*Married*Female*) is included to control for any gender-based differences in household responsibility associated with traditional families and the

presence of young children. A measure of the usual hours worked during the week (*UsualHrsWork*) is included to capture the effects of extra long workweeks on earnings. Since the sample has already been restricted to respondents who have usual hours of work of at least 36 h per week, *UsualHrsWork* reflects hours worked beyond 36.

The remaining independent variables defined in Table 1 are immigrant-specific characteristics. These variables include a measure of English language ability (*LimitedEnglish*), citizenship status (*Citizen*) and number of years in the U.S. (*10to20Years_in_US*, *>20Years_in_US*). Other variables relate to the respondent's country of origin, including country-of-origin dummy variables for the seven countries producing the largest number of African immigrants to the U.S., a dummy variable that indicates the level of country-of-origin per-capita gross domestic product is very low (*LowGDP*), two dummy variables indicating the main colonial influence in the country in 1914 (*BritishColony* and *FrenchColony*) and a dummy variable for the general region of the country of origin in Africa (*SaharanAfrica*).

Table 2 shows real average wage and salary incomes and real median wage and salary incomes for the pooled sample of full-time employed African immigrants and natives. Wage and salary incomes are in constant dollars expressed in 2015 prices using the Consumer Price Index for All Urban Consumers. African immigrant real average wage and salary income is slightly more than native real average wage and salary income for the pooled sample (\$65,220 versus \$64,034). Table 2 also shows that African immigrants are more likely than natives to have advanced college degrees, including master's, professional and doctorate degrees. As expected, there are substantial differences in average earnings across the eight educational attainment categories.

African immigrant college graduates are much more likely than native college graduates to have completed undergraduate STEM majors, with 51.3% of all African immigrant college graduates having a bachelor's degree in a STEM discipline compared to only 34.7% of all native-born college graduates. This overrepresentation of African immigrants in STEM disciplines is important because of the relatively high earnings associated with STEM skills. For example, in the pooled sample of fully employed adults, African immigrants with bachelors' degrees in STEM disciplines have average real earnings of \$97,640 compared to \$75,252 for African immigrants who have bachelor's degrees in non-STEM disciplines.

Table 2 also shows average and median earnings for immigrant-specific characteristics. These characteristics are unique to the immigrant population, such as the year of immigration, country of origin, and citizenship status. African immigrants who have U.S. citizenship and indicate that they speak excellent English have earnings advantages over those who do not have citizenship or have limited or no English language ability. Also, earnings are substantially higher for immigrants who have been in the U.S. for 20 years or more compared to those who have been in the U.S. fewer years.

Immigrant earnings can also be affected by country of origin. Table 2 shows that there are large earnings differences between African immigrants from various countries of origin. The six largest sources of immigrants to the U.S. are Nigeria, Egypt, South Africa, Ghana, Kenya and Ethiopia. Average wage and salary income varies widely across these six countries. For example, South African immigrants who are employed full-time have average wage and salary income of \$114,064, an average that is much greater than the average earnings of respondents from any of the other five countries.

Table 2 Pooled sample (2011–2015) distributions and average earnings

	African immigrant sample (N=26,166)			Native born sample (N=349,084)		
	Percent	Average earnings	Median earnings	Percent	Average earnings	Median earnings
Total	100%	\$65,220	\$45,181	100%	\$64,034	\$49,072
Highest educ. achieved						
Less than HS grad	5.7%	\$33,130	\$26,001	4.0%	\$37,709	\$30,949
High school grad	15.2%	\$37,644	\$30,333	24.2%	\$43,829	\$37,149
Some college	27.3%	\$46,486	\$37,153	32.9%	\$52,161	\$44,050
Bachelors	28.0%	\$68,969	\$53,060	24.3%	\$79,161	\$61,056
Masters	14.8%	\$87,755	\$71,007	10.4%	\$91,244	\$71,178
Professional	4.9%	\$161,716	\$110,569	2.7%	\$158,741	\$109,472
Doctorate	4.1%	\$115,309	\$90,424	1.5%	\$116,087	\$93,021
Gender						
Male	61.5%	\$72,413	\$49,550	66.0%	\$73,011	\$53,903
Female	38.5%	\$53,751	\$40,483	44.0%	\$52,616	\$42,049
Citizenship						
Not citizen	38.5%	\$55,858	\$38,038	NA	NA	NA
Naturalized citizen	61.5%	\$71,087	\$50,578	NA	NA	NA
Language ability						
Limited or no english	3.7%	\$33,252	\$24,940	NA	NA	NA
Good or excellent english	96.3%	\$66,461	\$46,454	NA	NA	NA
Years in U.S.						
1 through 9 years	24.2%	\$46,228	\$31,921	NA	NA	NA
10 through 19 years	39.1%	\$61,698	\$44,256	NA	NA	NA
20 or more years	36.7%	\$81,532	\$59,895	NA	NA	NA
Source country						
Egypt	8.7%	\$85,951	\$58,895	NA	NA	NA
Ethiopia	9.8%	\$49,234	\$36,156	NA	NA	NA
Ghana	9.3%	\$54,349	\$40,058	NA	NA	NA
Kenya	6.6%	\$66,253	\$47,422	NA	NA	NA
Nigeria	16.1%	\$66,065	\$51,618	NA	NA	NA
South Africa	7.3%	\$114,064	\$75,750	NA	NA	NA
Other African Countries	42.2%	\$58,111	\$40,691	NA	NA	NA
Colonial influence (1914)						
British Colony (1914)	42.6%	\$67,578	\$49,551	NA	NA	NA
French Colony (1914)	6.9%	\$64,049	\$46,027	NA	NA	NA
All others	51.5%	\$63,390	\$42,098	NA	NA	NA

Data source: Integrated Public Use Microdata Series (IPUMS) extract from American Community Surveys: 2011–2015 (Ruggles et al. 2015). Samples are 26,166 African immigrants and 349,084 native born respondents. All members of the samples are between 25 through 65 years, worked an average of at least 35 hours per week and worked at least 48 weeks over the past year

We also grouped countries of origin by gross domestic product (GDP) per capita (World Bank 2017), colonial background (Dvorsky 2015) and by whether the country of origin was in Saharan Africa to see if these characteristics were associated with immigrant earnings. Countries that are the most similar to the U.S. should produce emigrants that have human capital that is the most transferrable to the U.S. labor market (Borjas 1987). For example, we expect that immigrants from countries with higher GDP per capita and immigrants from countries that experienced colonization by the British to have skills that are more transferrable.

In sum, Table 2 shows that the sample of college-graduate African immigrants is different from the native sample in fundamental ways. They are more likely than natives to be male and to hold advanced degrees. Also, wages vary greatly within the immigrant group depending on characteristics. For example, immigrants with advanced degrees earn much more than those with less educational attainment, and certain immigrant-specific characteristics are associated with earnings, such as citizenship, years in the U.S., English language skills, and country of origin.

Using OLS regression and the pooled cross-sectional sample, we estimate a baseline earnings function separately for African immigrants and natives:

$$\text{LnRealWage}_i = \beta_0 + \beta_1 X_i + \delta_1 Y_i + u_i, \quad (1)$$

where, LnRealWage_i is the natural logarithm of individual i 's real annual wage and salary earnings and X_i is a vector of typical human capital and demographic variables that are typically included in earnings functions. Y_i is a set of dummy variables that control for the fixed effects associated with year of the survey in the pooled cross section (2011, 2012, 2013, 2014 and 2015) and are included to control for unobserved time-related determinants of income. Finally, u_i is the random error term.

The baseline model includes variables that are common to both natives and African immigrants. Its main purpose is to assess the effect of traditional human capital and demographic variables on earnings. Since such a large proportion of immigrants have advanced degrees and have undergraduate majors in STEM disciplines, we are particularly interested in the returns to the investments in education on African immigrant earnings.

The next step is to estimate African immigrant earnings in an empirical model that adds a set of immigrant-specific variables to the baseline model:

$$\text{LnRealWage}_i = \beta_0 + \beta_1 X_i + \delta_1 Y_i + \varepsilon_1 I_i + \phi_1 C_i + u_i \quad (2)$$

where I_i is a vector of variables that describe personal characteristics that are immigrant specific, such as years in the U.S. and citizenship status, and C_i is a vector of variables that represent characteristics of the immigrant's country of origin, such as GDP per capita, and colonial history indicators.

Using the pooled data, the baseline model is estimated separately for African immigrants and natives and the results are reported in the first two columns in Table 3. The baseline models include standard human capital and demographic variables that are available for both natives and African immigrants. All coefficients except

Table 3 Pooled regressions for natives and African immigrants: dependent = LnRealwage

	Native baseline	Immigrant baseline	Immigrant model 2	Immigrant model 3
Constant	8.203*	8.428*	8.591*	8.653*
Educational attainment				
<i>HighSchoolGrad</i>	0.187*	0.150*	0.090*	0.101*
<i>SomeCollege</i>	0.379*	0.348*	0.251*	0.272*
<i>Bachelors</i>	0.702*	0.557*	0.429*	0.464*
<i>Masters</i>	0.834*	0.777*	0.645*	0.677*
<i>Professional</i>	1.188*	1.171*	1.015*	1.065*
<i>Doctorate</i>	0.971*	0.940*	0.808*	0.845*
Bachelor's in stem major				
<i>Stem</i>	0.133*	0.233*	0.231*	0.225*
Demographics				
<i>Age</i>	0.063*	0.051*	0.048*	0.045*
<i>AgeSquared</i>	-0.001*	-0.0005*	0.0005*	0.0005*
<i>Female</i>	-0.155*	-0.004	-0.035*	-0.026
<i>Married</i>	0.219*	0.162*	0.134*	0.148*
<i>Female*Married</i>	-0.151*	-0.135*	-0.118*	-0.123*
Usual work hours in week				
<i>HoursWorked</i>	0.012*	0.010*	0.008*	0.009*
Immigrant characteristics				
<i>Citizen</i>			0.080*	0.069*
<i>LimitedEnglish</i>			-0.161*	-0.182*
<i>10to20Yrs_in_US</i>			0.153*	0.164*
<i>> 20Yrs_in_US</i>			0.305*	0.313*
Country of origin				
<i>Egypt</i>			0.069*	
<i>Kenya</i>			0.095*	
<i>Ethiopia</i>			-0.047*	
<i>Nigeria</i>			-0.008	
<i>Ghana</i>			0.011	
<i>South Africa</i>			0.388*	
<i>BritishColony</i>				-0.059*
<i>FrenchColony</i>				-0.075
<i>SaharanAfrica</i>				0.047*
<i>LowGDP</i>				-0.063*
Adjusted R-squared	.30	.29	.33	.32
Sample size	349,083	26,166	26,166	26,166

*indicates significance at .01 level

Data source: Integrated Public Use Microdata Series (IPUMS) extract from American Community Surveys: 2011–2015 (Ruggles et al. 2015)

one are statistically significant at the 0.01 level and have the expected signs. A Chow test is conducted to determine whether the true coefficients of the two baseline equations are equal (Wooldridge 2009). The Chow test generated an F statistic of 130.5, which was statistically significant at the 0.001 level. Thus, we reject the null hypothesis that there are no structural differences in coefficients between the African immigrant baseline equation and the native baseline equation.

African immigrants show high returns from educational attainment with coefficients being similar in magnitude to those in the native model. Therefore, African immigrants, like natives, have strong economic incentives to pursue education beyond high school. This near parity in returns to educational attainment between African immigrants and natives is not consistent with the skill transferability hypothesis discussed earlier which posits that returns to education will be lower for immigrants than natives because many immigrants acquire a portion of their human capital in their country of origin and this human capital is not completely transferrable to the destination country (Friedberg 2000).

The baseline regressions also show that having a bachelor's degree in a STEM discipline has a significant positive effect on earnings of both natives and African immigrants and that the return to having a STEM bachelor's degree is higher for African immigrants than natives. This is important because a relatively high proportion of African immigrants have their bachelor's degrees in STEM disciplines.

An unexpected result of the baseline regression analysis is that the negative effect of being female on earnings is greater in the native baseline model than in the African immigrant baseline model. Evaluating the coefficients for *Female* and the interaction variable *Female*Married* jointly indicates that non-married African immigrant women have achieved earnings parity with African immigrant men. However, both native and African immigrant married women are at an earnings disadvantage as indicated by the negative and significant coefficient to the interaction term *Female*Married*.

The last two columns in Table 3 present pooled regression results for the African immigrant sample. These two models add immigrant characteristics and country-of-origin characteristics to the baseline model. Both specifications include dummy variables for three immigrant characteristics: citizenship status, English language ability, and years in the U.S. The first model (Model 2 in Table 3) adds to these variables a set of six country-of-origin dummy variables for Kenya, Ethiopia, Nigeria, Ghana, Egypt, and South Africa. The second model (Model 3 in Table 3) replaces these six variables with a set of dummy variables that measure country-of-origin characteristics such as having a very low per capita GDP or having British or French colonial influences.

The Model 2 results in Table 3 show that immigrant-specific variables are important determinants of immigrant earnings. For example, years in the U.S. and citizenship are significant predictors of African immigrant earnings. African immigrants who have been in the U.S. for more than 20 years have a very large earnings advantage over those who have been in the U.S. less than 10 years. These strong returns from years in the U.S. are consistent with the argument that over time immigrants acquire U.S.-specific human capital, perhaps through networking, learning job-specific skills, and improving language skills. Language proficiency is also a significant determinant of African

immigrant earnings. Those with limited English language skills are at a significant earnings disadvantage compared to all other African immigrants who have good or excellent English language skills. Fortunately, only 3.7% of the African immigrant sample has limited or no English language skills.

Having established the importance of immigrant-specific characteristics on immigrant earnings, we now examine the impact of country-of-origin characteristics. The basic expectation is that those who emigrate from countries that are more like the U.S. have an advantage assimilating in the U.S. labor market because the human capital acquired in their home countries will be more transferrable to the U.S. labor market (Borjas 1987; Friedberg 2000). Model 2 (Table 3) includes six country-of-origin dummy variables for the African countries that have the largest number of immigrants in the U.S. (*Kenya, Ethiopia, Nigeria, Ghana, Egypt and South Africa*). The reference group is immigrants from all other African countries. The results are striking. South African, Kenyan and Egyptian immigrants have a large and statistically significant earnings advantage over the reference group, with the South African advantage being especially large.

Model 3 (Table 3) substitutes a set of country characteristics for the country-of-origin dummy variables just analyzed. These variables include dummy variables to indicate broad patterns of colonial influence (*BritishColony, FrenchColony*), whether the respondent comes from the Saharan region (*Saharan*), and whether the respondent comes from a country of origin with a per capita GDP that is less than \$1000 (*LowGDP*). A shortcoming of the GDP variable is that the ACS does not identify a specific country of origin for respondents from some countries and the World Bank (2017) does not have GDP data for all African countries. As a result of these two shortcomings, there are missing values for GDP data for 21.2% of our African immigrant sample. These respondents with missing values are combined with those from countries with per capita GDPs above \$1000 in the reference group.

In general, the country characteristic variables have the expected effects on African immigrant earnings. The region variable (*Saharan*) shows that respondents from the Saharan region of Africa have a significant and positive earnings advantage over those from Sub-Saharan Africa. This earnings advantage is not surprising since the Saharan region of Africa has greater proximity to Europe and is in many ways culturally different than Sub-Saharan Africa.

Surprisingly, countries colonized by the British and French did not have an earnings advantage compared to other African countries. In fact, being from a former British colony has a small negative effect on earnings. Finally, and as expected, emigrating from a country with very low per capita GDP (*LowGDP*) has a small negative effect on earnings relative to the reference group, but this result should be interpreted with care because of the large number of countries with missing values for per capita GDP.

Assimilation Analysis

We follow a cohort of full-time employed African immigrants and natives over a ten-year period (2005 through 2015) to determine the extent that immigrant wages have converged with native wages. Chiswick (1978, 1999) and others (e.g., Waters and Jiménez 2005; Wu and Seeborg 2012) present evidence that immigrants, as a group, have experienced relatively rapid economic assimilation in American labor markets. Immigrants arrive with skills that are not completely transferrable to the American labor

market. Over time, they have incentives to invest in U.S.-specific human capital, and these investments produce earnings convergence with natives. Thus, we expect African immigrants to initially earn lower wages than natives with a reduction in the wage differential over time as they acquire U.S.-specific human capital.

To conduct the assimilation analysis, we follow four cohorts: African immigrant college graduates, native college graduates, African immigrant non-college graduates, and native non-college graduates. Data are extracted from the American Community Survey for 2005, 2007, 2009, 2011, 2013 and 2015. Each cohort is restricted to adults who are employed full-time, year-round. We age the cohorts from one survey year to the next so that the same cohort is being followed from 2005 through 2015. For example, the 2005 cohort is 25 through 56 years old and the 2007 cohort is 27 through 58 years. We also require that all immigrants in the sample to arrive in the U.S. in 2004 or earlier. These restrictions ensure that we are following the same cohort of immigrants from 2005 through 2015.

Table 4 presents average earnings for each of the four cohorts between 2005 and 2015 in constant dollars (2015 prices). It shows that the wage gap between the native and African immigrant cohort narrowed for both college graduates and non-college graduates. By 2015 the African immigrant cohort showed a 0.8% unadjusted earnings advantage over native college graduates. However, non-college graduate African immigrants started with a larger unadjusted 11.3% wage gap in 2005 compared to native non-graduates, but this gap narrowed considerably by 2015 to 7.3%.

Although the average earnings differences are interesting, they do not control for human capital and demographic differences between African immigrants and natives. To accomplish this, we adapt a procedure used by Wu and Seeborg (2012) to determine trends in Chinese and Mexican earnings assimilation with natives. This procedure involves estimating earnings functions for native respondents and then using these native earnings functions to estimate what African immigrants would have earned if they had received the same returns as natives but had their actual human capital and

Table 4 Native and African Immigrant average wage by education and year

Year	College grads (at least bachelor's)			Non-college graduates		
	African immigrants	Native born	Percent difference*	African immigrants	Native born	Percent difference*
2005	\$86,715	\$91,719	-5.8%	\$43,821	\$49,379	-12.7%
2007	\$85,275	\$95,995	-12.5%	\$44,858	\$50,759	-13.2%
2009	\$89,291	\$95,678	-7.2%	\$45,566	\$50,726	-11.3%
2011	\$91,035	\$93,908	-3.2%	\$46,030	\$48,648	-5.7%
2013	\$99,063	\$97,625	1.5%	\$46,869	\$50,239	-7.2%
2015	\$102,652	\$101,784	0.9%	\$48,338	\$52,140	-7.9%

*Percent difference is calculated using African immigrants as the base

Data source: Integrated Public Use Microdata Series (IPUMS) extract from American Community Surveys: 2005–2015 (Ruggles et al. 2015)

demographic endowments. These estimates are made by plugging African immigrants' human capital and demographic characteristics into the native earnings function.

The following five-step procedure describes in greater detail the process that we use to estimate the wage gap between African immigrant college graduates and native college graduates for one year for the college-graduate cohort (Wu and Seeborg 2012).

1. Estimate the following baseline earnings function for college-graduate native-born respondents for ACS survey year 2005:

$$\begin{aligned} \ln RealWage_i = & \beta_0 + \beta_1(Masters)_i + \beta_2(Professional)_i + \beta_3(Doctorate)_i + \\ & \beta_4(Age)_i + \beta_5(AgeSquared)_i + \beta_6(Female)_i + \beta_7(Married)_i + (3) \\ & \beta_8(Female * Married)_i + \beta_9(HoursWorked)_i + u_i. \end{aligned}$$

2. Compute the mean values for all independent variables for African immigrant college graduates in the sample for ACS survey year 2005.
3. Plug the African immigrant mean values into the native earnings function. This produces an estimate of what natives would earn if they had African immigrant human capital and demographic characteristics.
4. Subtract the actual average earnings for African immigrants from the estimated earnings from step 3 to get the simulated wage gap.
5. Repeat steps 1 through 4 for the remaining 5 years (2007, 2009, 2011, 2013 and 2015).

After completing the above five-step analysis for college graduates, the process is repeated for respondents who have not completed college. The model specification for non-college graduates is similar to the college graduate model except for the controls for education. The model estimated for non-college graduate natives is:

$$\begin{aligned} \ln RealWage_i = & \beta_0 + \beta_1(Grades9-12)_i + \beta_2(HighSchool Grad)_i + \beta_3(Some College)_i + \\ & \beta_4(Age)_i + \beta_5(AgeSquared)_i + \beta_6(Female)_i + \beta_7(Married)_i + \beta_8(Female * Married)_i + (4) \\ & \beta_9(HoursWorked)_i + u_i. \end{aligned}$$

In sum, this procedure produces simulated earnings gaps between African immigrants and their native-born counterparts for six years (2005, 2007, 2009, 2011, 2013, and 2015). The result of this repetitive process is the estimation of 12 earnings gaps, six for college graduates and six for non-college graduates.

The two tables presented in the Online Supplementary Appendix illustrate the process of estimating African immigrant earnings for the years 2005 and 2015 for college graduates (Online Supplementary Appendix Table 1) and non-college graduates (Online Supplementary Appendix Table 2). Estimates for the remaining four years are not presented but are very similar to the two years shown. These appendix tables demonstrate how plugging African immigrant human capital and demographic averages into the native equation produce the immigrant earnings estimates. Conceptually, these estimates show what African immigrants would earn given their own characteristics when rewarded according to the native earnings function.

Table 5 presents both the actual earnings gaps and the simulated earnings gaps between African immigrants and natives. The simulated gap is estimated through the five-step procedure. Table 5 shows how the earnings gaps change between 2005 and 2015. In general, we see reductions in the earnings gap over time for both African immigrant college graduates and non-college graduates relative to their native-born counterparts. Although the simulated earnings gap for college graduates was quite large (-18.8%) in 2005, it narrowed considerably to -4.9% by 2015. Thus, over the 10-year period from 2005 to 2015, college graduate African immigrants made significant progress in closing the estimated earnings gap with native college graduates.

The estimated earnings gaps for the college graduate samples presented in Table 5 are much greater than the actual unadjusted earnings gaps. A likely explanation of this is that African immigrant college graduates are more likely to continue their education beyond the bachelor's degree than their native counterparts. When these and other advantages of African immigrants are controlled for in the simulation, the estimated earnings gap between African immigrants and natives becomes larger than the actual earnings gap. For example, in 2015 college graduate African immigrants have an actual earnings advantage of 0.9% relative to natives. But, simulating the earnings differential through the five-step procedure gives college graduate African immigrants a 4.9% earnings disadvantage relative to natives (Table 5).

Table 5 also shows that the earnings convergence of college graduates has not been steady between 2005 and 2015. This is likely the result of the financial crises around 2007 followed by the sharp recession beginning in 2009. The estimated earnings gap between African immigrants and native college graduates actually increased between 2005 and 2007, from 18.8 to 24.0% , and then began to fall steadily through 2015. The economic assimilation of college-educated African immigrants seems to be adversely affected by economic shocks that impact white-collar job markets.

Table 5 Actual and simulated percent wage difference* between U.S. native-born and African immigrants: 2005–2015

Year	College grads (at least bachelor's)			Non-college graduates		
	African Immigrant earnings average	Actual earnings gap with natives	Simulated earnings gap with natives	African Immigrant earnings average	Actual earnings gap with natives	Simulated earnings gap with natives
2005	\$86,715	-5.8%	-18.8%	\$43,821	-12.7%	2.9%
2007	\$85,275	-12.5%	-24.0%	\$44,858	-13.2%	2.8%
2009	\$89,291	-7.2%	-18.8%	\$45,566	-11.3%	9.5%
2011	\$91,035	-3.2%	-14.2%	\$46,030	-5.7%	13.8%
2013	\$99,063	1.5%	-12.6%	\$46,869	-7.2%	9.5%
2015	\$102,652	0.9%	-4.9%	\$48,338	-7.9%	10.4%

*Percent wage difference is calculated using African immigrants as the base. The simulated earnings gap is calculated by subtracting the actual immigrant earnings from the simulated native earnings from the five-step procedure outlined in the paper and then using actual immigrant earnings as the base to determine the earnings gap in percent

Data source: Integrated Public Use Microdata Series (IPUMS) extract from American Community Surveys: 2005–2015 (Ruggles et al. 2015)

The non-college graduate cohort of African immigrants also shows improvement in their average earnings relative to native-born non-college graduates. Table 5, for example, shows that the actual average earnings gap of non-college graduate African immigrants relative to their native counterparts was -12.7% in 2005, but by 2015 the earnings gap is only -7.9% . Surprisingly, when we conduct the five-step cohort assimilation estimations, the non-college African immigrant cohort had an earnings advantage over their native counterparts of 2.9% in 2005 which grew to a 10.4% advantage in 2015. Thus, once differences in human capital and demographics are controlled for in the simulation, non-college graduate African immigrants have higher simulated earnings than their native counterparts and their advantage increased between 2005 and 2015.

Conclusion

Using a pooled cross section drawn from the American Community Survey, this paper explores the main determinants of the earnings of a large sample of employed African immigrants. African immigrants are more likely to have advanced degrees, especially professional degrees and doctoral degrees, and were far more likely to have completed bachelor's degrees in STEM majors compared to native-born respondents. We also find that, like their native counterparts, African immigrants have high returns from educational attainment and realize higher returns than natives from having a bachelor's degree in a STEM major.

The pooled cross-sectional analysis also explores the effect of a number of immigrant-specific variables on earnings. The regression results show that immigrant earnings vary greatly in response to citizenship status, years in the U.S., English-speaking ability and country of origin. We find, for example, that immigrants who have been in the U.S. for more than 20 years have significantly higher earnings than recent arrivals, and that becoming a naturalized citizen is positively related to earnings. English proficiency is also important.

An important policy implication of the pooled cross sectional results is that policies that incentivize African immigrants to pursue STEM disciplines and advanced degrees through fellowships, assistantships and student visas will likely increase the earnings of African immigrants. Also, since earnings increase rapidly with years in the U.S., visa policy should not be oriented toward temporary work experience but should lead with some certainty to permanent resident status and ultimately citizenship.

We also conduct a cohort-based assimilation analysis by following a cohort of African immigrants and natives over a ten-year period to determine the extent that their earnings have converged. Descriptive statistics of average earnings show that college-graduate African immigrants start with an earnings disadvantage in 2005, but by 2015 they experience a small earnings advantage over natives. When we employ a regression-based assimilation analysis, we find that the initial earnings gap between college-graduate African immigrants and college-graduate natives is much larger than suggested by descriptive statistics. However, the gap narrows considerably by 2015 to a 4.9% earnings advantage for natives. Therefore, we conclude that there has been substantial earnings convergence between college-graduate immigrants and college-graduate natives but that the convergence is not complete. If the current trends continue, earnings convergence for this cohort is likely. The significant convergence of wages is

consistent with the idea that acquisition of U.S.-specific human capital benefits immigrants after they arrive in the U.S. (Chiswick 1978, 1999; Waters and Jiménez 2005; Wu and Seeborg 2012).

Non-college graduate African immigrants also show gains relative to their native counterparts. However, they have significant human capital disadvantages. Descriptive statistics, for example, show that they have average earnings that are 12.7% lower than non-college graduate natives. However, the regression-based assimilation analysis shows that this cohort of immigrants has an earnings advantage over natives once differences between native and immigrant human capital and demographic endowments are taken into account.

We find that some countries of origin, especially South Africa, have a significant earnings premium and that characteristics of the countries of origin, like colonial heritage and per capita GDP, have some effects on immigrant earnings. This exploration of the influence of country-of-origin influences, however, is very preliminary and should be the subject of future research that explores why certain countries of origin have advantages over others with attention to possible patterns of immigrant-specific characteristics such as English language ability, citizenship status, and years in the U.S.

Future research could also focus on the determinants of employment status of working age African immigrants through a framework similar to the one employed in this paper. For example, in the pooled sample of working age persons, we find that African immigrants are more likely than natives to be employed (76.3% versus 70.7%), more likely to be unemployed (6.1% versus 4.6%) and less likely to be out of the labor force (17.6% versus 24.7%). Analysis of employment status differences and how they change over time would advance understanding of the assimilation process.

Finally, future research could address a possible bias in this study from selective return migration. We argued that immigrant assimilation is likely the result of improvements in the productivity of the immigrants as they acquire U.S.-specific skills. Immigrant improvements in relative earnings could be at least in part due to the return migration of low earners. Unfortunately, we are not able to explore this issue with the ACS because only U.S. residents take the survey.

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