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#### Labour- and education-related migration

## The Impact of Education-Related Migration on International Migration Statistics in the United States

Note by the United States Census Bureau<sup>1\*</sup>

### *Abstract*

Foreign-born immigration to the United States has been on the rise, increasing from 1.1 million in 2010 to 1.5 million in 2016, according to most recent Census data. At the same time there has been a shift in the countries of origin of international migrants, where Mexico is no longer the primary sending country due to increasing migration from China and Asia (Jensen 2015). Over the same time, according to non-immigrant admissions data released by the Department of Homeland Security (DHS), foreign student admissions increased from 740,000 in 2006, to 1.6 million in 2010, to 2 million in 2015. Is the recent increase in foreign-born immigration and shift in countries of origin simply a reflection of this increase in education-related migration to the United States?

These recent patterns raise several questions related to the Census Bureau's ongoing work in estimating international migration and impacts to the resident population of the United States. How well are students picked up in data sources used by the Census Bureau to produce international migration estimates, and are recent trends simply a reflection of an increase in student population? Do students leave the United States after graduation, or do they stay to work in the U.S. job market?

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<sup>1</sup> Views expressed in this paper are those of the authors and not necessarily those of the Census Bureau.

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This paper provides an overview of international standards for measuring students as international migrants, while also looking at the measurement experiences of the United States and international organizations. Analysis will compare American Community Survey (ACS) estimates of foreign-born immigrants enrolled in school, data on student admissions released by DHS, and survey data collected by the International Institute of Education on the size of the international student population.

Of particular interest are the extent to which international students are measured in the ACS and their impact on net international migration estimates to the United States. Possible considerations and adjustments to future Net International Migration estimates, including how we distribute migrant characteristics at the subnational level, will be discussed.

## I. Introduction

1. The international movement of students has increased over time, becoming an important subset of total international migration, and a potential source of population increase in the United States. The United States has the largest number of international students enrolled in tertiary-level education in the world, exceeding 1 million for the first time during the 2015-2016 academic year (IIE 2016). There has been rapid growth in this and other student populations, as according to non-immigrant<sup>2</sup> admissions data released by the U.S. Department of Homeland Security (DHS), foreign student admissions increased from 740,000 in 2006, to 1.6 million in 2010, to 2 million in 2015 (OIS 2016). During this period, total foreign-born immigration to the United States has risen, increasing from 1.1 million in 2010 to 1.5 million in 2016.<sup>3</sup> Associated with this increase in immigration has been a shift in the countries of origin of international migrants, whereby Mexico is no longer the primary sending country due to increasing migration from China and India and decreasing migration from Mexico (Jensen et al. 2015a). These recent patterns raise several questions related to the U.S. Census Bureau's ongoing work in estimating international migration and the impacts to the resident population of the United States. Is the recent increase in foreign-born immigration and shift in countries of origin simply a reflection of this increase in education-related migration to the United States? Furthermore, to what extent do Census Bureau data sources, such as the American Community Survey (ACS), measure international students?

2. Whether to count students as migrants is a question with which many countries struggle. Some high emigration countries believe students retain family and social ties with their countries of origin and will eventually return home after graduation, in which case students should not be counted as out-migrants (UNECE 2014). Conversely, some high immigration countries would prefer not to count students as

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<sup>2</sup> Non-immigrants are a class of international migrants who temporarily stay in a host country for a specific purpose. Examples include foreign government officials, temporary workers, and students. Although certain non-immigrants may stay in a country for over one year a permanent change in residence does not take place.

<sup>3</sup> Estimates from the one-year American Community Survey.

in-migrants, due to policy or political concerns, in order to more accurately reflect lower migration levels or reduce levels over time (ONS 2013). However, according to United Nations (UN) international recommendations, migration should be defined as a change in usual residence, normally defined as a period of 12 months. Thus, anyone meeting these criteria, whether a student or not, should be counted as a migrant (UN 1998). International students are included in Census Bureau's estimates of international migration if they meet the residence criteria for data sources used to produce these estimates, which in the case of the ACS is a two-month period of stay. Conversely, the DHS Office of Immigration Statistics (OIS) measures international students based on visa status, which considers students to be non-immigrants.

3. This paper will provide an overview of international standards for measuring students as international migrants, focusing on the measurement experiences of the United States. Exploratory analysis will compare ACS estimates of foreign-born immigrants<sup>4</sup> enrolled in school, data on student admissions released by DHS and OIS, and survey data collected by the International Institute of Education (IIE) on international students enrolled in tertiary-level<sup>5</sup> academic institutions. This paper also analyzes foreign-born immigration of students by country of birth. Of particular interest is the extent to which the ACS measures international students and the impact on net international migration (NIM) estimates for the United States. We also discuss possible considerations and adjustments to future NIM estimates, including how we estimate migrant characteristics at the subnational level.

## II. Background

4. Our interest is in the impact foreign students have on the total resident population of the United States, for which we produce annual estimates. NIM represents a sizeable component of overall change in the population distribution and demographic composition of the United States. While international students comprise a small population at the national level, they are disproportionately represented at the sub-national level, clustered in counties with colleges and universities. The Census Bureau's current estimation method for measuring foreign-born immigration flows for the NIM estimate uses the ACS residence one year ago (ROYA) question. Due to recent growth in foreign student migration, students could now comprise a sizeable share of NIM.

5. Administrative data can show annual patterns in international student flows over the past decade, while survey data can provide detailed characteristics about these flows. However, it is difficult to compare survey to administrative data based international migration flow estimates, as definitions and universes differ between these data sources. Administrative records often measure events (e.g. entries to the United States), while surveys measure individual migratory moves establishing residency in the United States.

6. Unlike refugees and asylees, student migration is not a clearly defined concept. Not only can this definition vary across countries, it can also vary within a country's statistical system. The measurement of student migration is usually based

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<sup>4</sup> When describing ACS and population estimates, we use the term immigration to denote one of the migration-based components of population change.

<sup>5</sup> Tertiary-level in this case refers to undergraduate education and higher and excludes vocational school.

on some known information about citizenship, residence status, and purpose of move. International students typically represent individuals who have temporarily crossed international boundaries for the purpose of study. The UN recommendations on Statistics of International Migration define foreign students as “persons admitted to a country other than their own, usually under special permits or visas, for the specific purpose of following a particular course of study in an accredited institution of the receiving country” (UN 1998). The UN recommendations do not make distinctions based on migrant status (e.g. visa type), thus international migration statistics would include any international movement resulting in a change of usual residence. However, the recommendations do identify students as one example of persons who might have difficulty determining usual residence if they live at a school away from their parental home or if they expect to return to their previous residence in the future. In these cases, the UN recommends specific time limits (12 months for long-term migrants and 3-months for short-term migrants), either in the destination country or away from the origin country, be used to determine change in usual residence. The UN also recommends that arriving and departing foreigners, admitted as students (as well as their dependents), be recorded as their own category when compiling migration flow data.

7. A number of international organizations and academia have produced reports or conducted analysis on international or foreign students, applying their own definitions and methods to measure these groups (UNESCO 2006, OECD 2016, Guruz 2011, Verbik and Lasanowski 2007, Woodfield 2010). Measurement normally incorporates reasons for move (e.g. intent to study), citizenship or nativity status, school enrollment status, legal status (e.g. visa type), and level of educational attainment prior to moving in the host country of study. Students can be defined as “international” (those who move to a country with the specific intent to study) or “foreign” (non-citizens of the country, who are students in the country). Students are further differentiated on whether they are enrolled in a degree-granting program or a non-degree-granting program (e.g. language training). Though international focus tends to be on college and graduate students, OIS does not differentiate between tertiary or secondary education or degree and non-degree admitted students when tabulating non-immigrant student visa statistics.

8. For statistical purposes, the Census Bureau does not exclude foreign students from its estimates of the United States population, as long as these individuals meet usual residence criteria, which can differ based on data source. The Census Act of 1790 established the concept of “usual residence” (where a person lives/sleeps most of the time), which all decennial censuses have since followed. Census 2010 residence rules clearly state that foreign students living in the United States while attending college are to be counted at their on-campus or off-campus residence, where they live and sleep most of the time (U.S. Census Bureau 2012). Census residence rules do not specify how to address foreign students in the United States who are attending boarding school below the tertiary-level. These students are to be counted at their parents' place of residence in the United States, but nothing is specified for those whose parents live outside the United States.

9. The Census Bureau’s primary source for measuring international migration is the ACS, which is an annual ongoing survey of the United States population, sampling about 3.5 million housing units per year. Since 2006 the ACS has collected information from both housing units and group quarter facilities, using the concept of “current residence.” Current residence in a housing unit is defined as having lived

in or intending to live in the sampled address for at least two consecutive months. Thus, any foreign student intending to stay for two months or more would be included in the sample and our international migration estimates. Within group quarters, which include college dormitories and residence halls, sampling is even more inclusive, as it is determined by a de facto residence rule. All people staying in group quarters are eligible for selection for interview regardless of length of stay (U.S. Census Bureau 2014). Therefore, it is possible that very short-term migrants will be included in our sample of foreign-born immigrants.

10. For the compilation of immigration statistics, the ACS concept of current residence has no relationship to legal immigrant or non-immigrant status as denoted by visas issued by other Federal agencies (e.g. DHS or the U.S. Department of State). The ACS does not measure intent of migration (per UN definition) or legal status (implicit in the OIS definition of non-immigrant status), but is limited to the current residence criteria described previously. The Current Population Survey (CPS), the labor force survey for the United States, does ask a subjective “main” reason for move question of all domestic and international movers, which could provide us a source for future research to evaluate the extent to which migrants enrolled in school are moving to the United States for education-related reasons.

11. Administrative data compiled by OIS measure students based on visas used for admittance to the United States, which include non-immigrant student visas: F-1 for academic students and M-1 for vocational students, as well as J-1 for exchange visitors. When a student visa expires, the person is expected to return to their home country, unless granted a change in visa status (e.g. work visa, marriage visa, etc.). As we will see, it is difficult to create comparable foreign student flow statistics between Census survey and OIS administrative data.

12. Though their numbers are relatively small, foreign students can have a large impact on estimates for certain subnational geographies (e.g. college counties). Whether or not a student returns to their country of origin after finishing their studies in the United States has important implications for our NIM estimates, which are the difference between in- and out-migrants. Though out-migration is difficult to measure, evidence does not support the premise that most foreign tertiary-educated students will return to their home country immediately after graduation. According to one estimate, the majority of Chinese and Indian born college and graduate students chose not to return to their home country after finishing their studies in the United States (Altbach 2004). Similarly, a small sample of foreign-born Science Technology Engineering and Math graduate students at a large public university showed that 78 percent intended to remain in the United States after graduation (Han et al. 2015). Also, the percentage of foreign born who are still in the country five years after receiving doctorate degrees from American universities has increased since the early 1990s, as two-thirds receiving degrees in 2006 were still present in 2011 (Finn 2014). This evidence suggests that a sizeable share of foreign students will eventually become permanent migrants to the United States, either immediately after graduation or as a future move back to the United States.

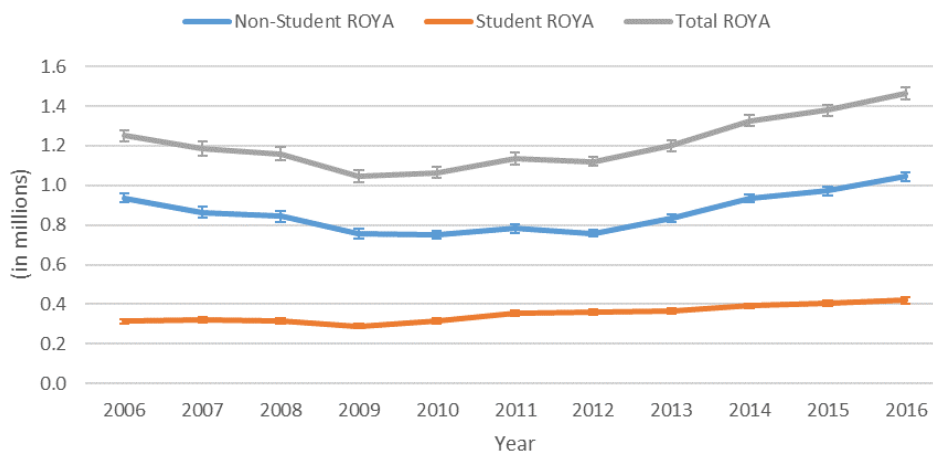
### **III. Foreign-Born Student Immigration**

13. As described earlier, ACS-based estimates of total foreign-born immigration have increased in recent years. To get a sense of how much the increase in our annual

foreign-born immigration flow component was due to an increase in student migration, we developed our own ACS estimates of foreign-born student flows. These are not directly comparable to OIS figures, as will be explained, but give us a means to evaluate the potential impact of increased international student migration on our foreign-born immigration flow estimates.

14. While measuring non-citizen students would bring us closer in-line with administrative data on student visas, we primarily look at the foreign born enrolled in school who were living outside the United States one year ago in order to evaluate our NIM estimates.<sup>6</sup> Our intent is to measure the first “permanent” migration event for students, whereby residency in the United States was established. Looking at those who migrated one year ago, in conjunction with current school enrollment, should provide a decent measure of international student flows, though we do not know if the move was specifically for study. If we were examining student stock, then it would be preferable to evaluate these numbers by citizenship and year of entry, to avoid including foreign-born persons who moved to the United States at a young age, and are thus included as part of the student population.

Figure 1. Foreign born whose Residence One Year Ago (ROYA) was outside the United States, by Enrollment Status: 2006 through 2016



Data Source: U.S. Census Bureau, 2006 through 2016 American Community Survey 1-Year Estimates, 90% confidence intervals shown

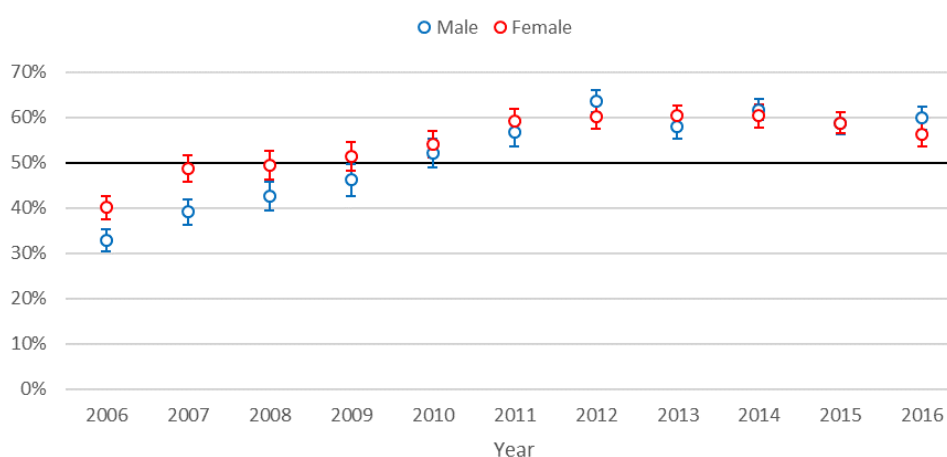
15. Figure 1 shows foreign-born immigration estimates as measured by the ACS ROYA question. Total immigration declined between 2006 and 2009, before steadily rising thereafter, corresponding to global downward economic conditions. However, from 2011 to 2016, the estimated flow of foreign-born immigrants to the United States increased about 30 percent (from 1.14 million to 1.46 million). In comparison, student migration has been more stable than total foreign-born immigration, increasing since 2009. From 2006 to 2016, student immigration increased from 300,000 to 400,000 per year, an increase of 33 percent. As a percentage of the total immigration flow, 25 percent of foreign-born immigrants were students in 2006. This

<sup>6</sup> Numbers for foreign-born and non-citizens enrolled in school, having lived outside the United States one year ago, are quite similar, with slightly larger (about 5%) flows for foreign-born students.

percentage steadily increased to over 30 percent in 2011, but has stabilized since 2014, being about 30 percent in 2016. These findings suggest that though students are sizeable contributors to our overall foreign-born immigration NIM component (by comparison, refugees made up less than 10 percent of the total immigration flow in 2015 (Schachter et al 2016)), they do not explain the entire increase of immigration seen since 2009, which has likely also been fueled by groups like labor and family-related migrants.

16. In the context of the NIM estimates, the age distribution of the foreign-born immigration component tends to have most migrants concentrated within the 18 to 24 age group. Figure 2 shows the share of ROYA ages 18 to 24 who are students from 2006 to 2016 by sex. Percentages were lower for men compared to women at the start of the period. This can reflect a time when most young adult men were coming to the United States to work rather than study. However, students began to comprise the majority share of ROYA around 2010. This transition coincides with the relative decline in non-student migration during this period, as previously shown in Figure 1. From 2011 onwards, the majority of male and female ROYA ages 18 to 24 are students (this age group will predominately represent tertiary-level students). In addition, the percentages for men and women are not significantly different since 2010.

Figure 2. Student Share of Foreign-Born Immigration within the 18 to 24 Age Group by Sex: 2006 through 2016



Data source: U.S. Census Bureau, 2006 through 2016 American Community Survey 1-Year Estimates, 90% confidence intervals shown

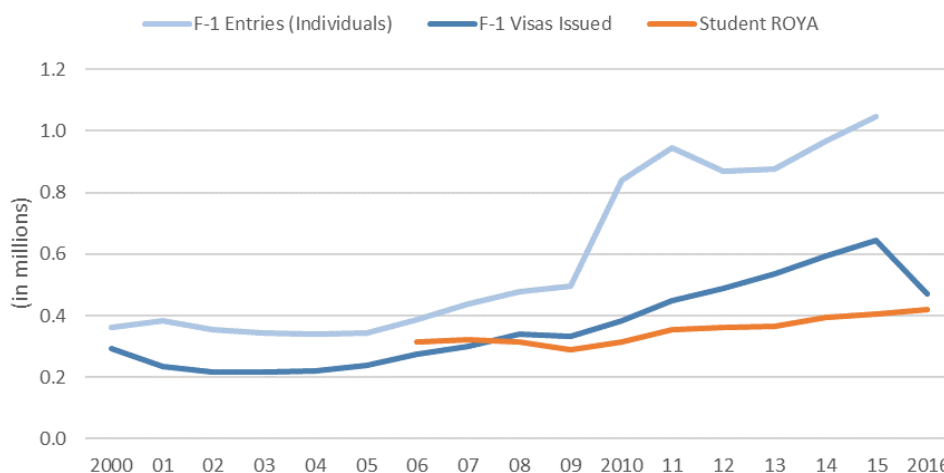
#### IV. Administrative Data Trends

17. While administrative data are not directly equivalent to our ACS estimates, they do provide us with valuable information about increasing trends in student visa admissions, which correspond to trends seen in ACS data. The ACS shows that students are increasing and have comprised a larger share of total immigration over time. At the same time, there was a dramatic increase in the number of non-immigrant F-1 visa (student) admissions to the United States, which tripled between

2000 and 2016 (650,000 to 1.9 million).<sup>7</sup> Part of this increase was due to a change in recording methodology in 2010, but even accounting for this, the number of F-1 admissions still increased 25% between 2010 and 2015 from 1.5 to 1.9 million (OIS 2016). Research by the Brookings Institute (Ruiz 2014), looking at detailed I-20 data for F-1 students, suggests that much of this increase in recent years is due to an increase in students admitted to the United States for language training, particularly since 2001. This could have important comparability implications with flows derived from ACS, given that language-training programs are often of a relatively short duration, and could be an area of future investigation.

18. It should also be noted that OIS visa statistics do not represent individuals, but rather the total number of entries for people holding F-1 student visas. Therefore, this counts multiple moves of the same person during the year (e.g. a foreign student could leave and re-enter the United States multiple times during the year). OIS provided us with individualized admission figures for the time period, showing similar upward trends in admissions (see Figure 3).

Figure 3. Comparison of Administrative Data on F-1 Student Visas and ACS Student ROYA: 2000 through 2016



Data source: Office of Immigration Statistics (2016), U.S. Department of State (2016), U.S. Census Bureau, 2006 through 2016 American Community Survey 1-Year Estimates

Notes: OIS and State Department data are reported by fiscal year, whereas ACS data are reported by survey year. For years prior to 2012, authors approximated individuals from OIS F-1 admissions data from conversations with OIS. In 2010, land border data systems were upgraded to record entries that were previously excluded from data. Land admissions of Canadian and Mexican citizens contributed to higher levels of F1 entries (DHS, 2010).

19. The highest series in Figure 3 represent individualized admission figures based on conversations with OIS. However, even with individualized numbers, these

<sup>7</sup> This analysis limits itself to F-1 visas. M-1 visas are issued for vocational students, who are outside the ACS school enrollment question universe, while J-1 visas are issued to exchange visitors, which includes both students and faculty, thus it is not possible to determine how many students are actually admitted.



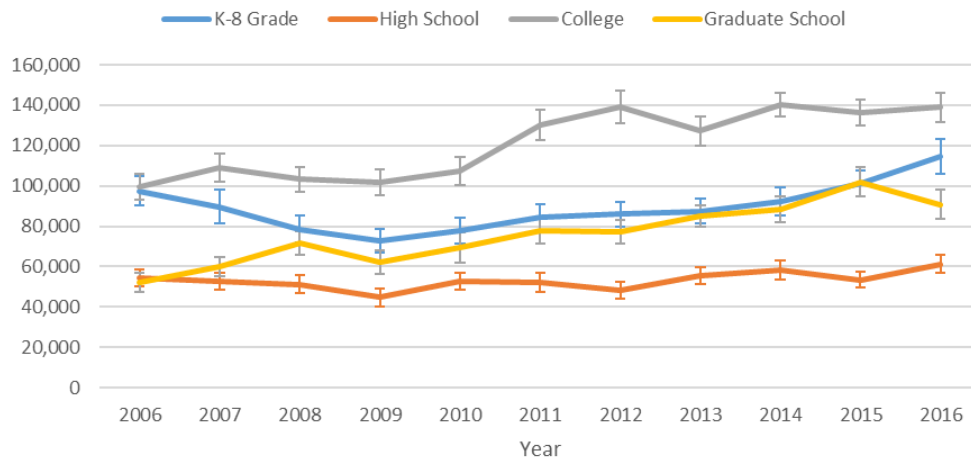
are still not directly comparable to ACS migration flow numbers, as OIS estimates include both new students and returning students who visited abroad (but individualized would only count each once, regardless of how many trips they made during the year). ACS estimates of immigration flows would normally only include “new” students, who are first establishing “current” residence in the United States. Using undergraduate college students as an example, the change in current residence from the home country to the United States will occur in the first year, at the start of their college program. These individuals may make visits back home during academic breaks, however for the purpose of ACS estimates, these visits do not represent migration. The change in current residence will not occur again until the individual has completed his/her course of study and returned home for a period of time.

20. The best administrative equivalent to ACS flow numbers would be new F-1 visas issued during the year, for academic programs with a duration of 2 months or more. The U.S. State Department does provide counts of new F-1 visas issued during the year from its offices abroad, but does not distinguish visa duration (duration is determined by I-20 forms, set by U.S. Immigration and Customs Enforcement (ICE), in conjunction with the academic institutions). These numbers are also the total number of F-1 visas granted, and do not necessarily mean a person actually matriculated in a school in the United States, thus will somewhat overestimate the actual flow. As can be seen in Figure 3, F-1 issuance numbers have also steadily increased since 2006, and are closer to ACS in size, though with a steeper slope, at least until 2016 when a precipitous drop was seen (from 644,000 to 472,000). Determining the reason for this drop would require additional investigation. Despite data comparability issues, these numbers suggest the ACS underestimates international students compared to administrative data, though it is unclear to what extent.

## V. Tertiary-Level Student Migration

21. The ACS can further evaluate student migration by characteristics like education level and country of origin. Figure 4 shows foreign-born student migrants by level of educational institution. Student migration by education level shows quite a bit of year-to-year variation, which is masked when looking at total student migration. After 2006, undergraduate college students became the largest category of student migrants. Tertiary-level categories (college, graduate, and professional school) exhibit growth between 2006 and 2016, while categories below the tertiary-level (K-8 grade and high school) levels did not change substantially between 2006 and 2015. It is likely that K-8 grade (and many high school) foreign-born student immigrants are likely accompanying parents not entering the United States on F-1 visas, thus this group is likely inflating ACS numbers in comparison to administrative data. Finally, the ACS does not contain a separate category for those enrolled in language training programs, which comprise a sizeable share of students with F-1 visas (Ruiz 2014), and these school enrollment figures would not include them.

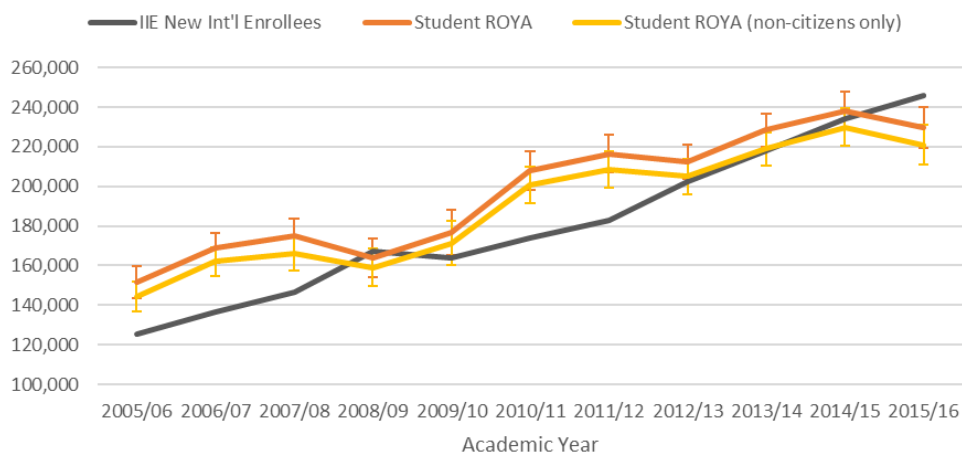
Figure 4. Foreign-Born Immigration of Students by Education Level: 2006 through 2016



Data source: U.S. Census Bureau, 2006 through 2016 American Community Survey 1-Year Estimates, 90% confidence intervals shown

22. A non-Census source on the foreign college student population is from data collected and disseminated by the IIE, a non-profit organization based in the United States. The IIE surveys 3,000 institutions of higher learning in the United States, where approximately 20% of total international student enrollment are concentrated in 25 institutions (IIE 2016). IIE data reflect F (student) and J (student exchange visitor) visas holders, excluding students below the tertiary-level and student enrolled in vocational schools. Given differences in definitions used for students and residency, IIE data are not directly comparable to Census Bureau data, but can be used to verify trends and provide some idea of the extent the ACS accurately estimates the foreign student population.

Figure 5. International College and Graduate Students by Academic Year: 2005/2006 through 2015/2016



Data source: IIE Open Doors (2016); U.S. Census Bureau, 2006 through 2016 American Community Survey 1-Year Estimates, 90% confidence intervals shown for ACS data.

Notes: 90% confidence intervals shown for ACS data. IIE totals are reported by academic year, whereas ACS estimates are reported by survey year. IIE only includes international students studying at an institution of higher learning in the United States on an F-1 student visa or J-1 exchange visitor visa. Vocational and students below the tertiary level are not included.

23. Figure 5 compares tertiary-level student ROYA from the ACS with IIE estimates of new international enrollees per year, which represent annual new student arrivals. IIE data show an increase in new International students that enrolled in college and graduate programs from 126,000 in 2005/2006 to 246,000 in 2015/2016. The ACS and IIE totals follow similar trends. Since we would expect the ACS foreign-born universe to be consistently higher, given the student universe includes naturalized foreign-born citizens, as well as other migrants who may have entered the United States for reasons other than study (e.g. family reunification) a better comparison to IIE data would be with non-citizens. Results for ROYA non-citizens track closely with IIE data.

24. Figure 5 comparisons provide evidence that ACS population estimates pickup much of 18-24 year old students. Given ACS and IIE levels for tertiary-level students are so close, one may consider that the differences between ACS and OIS administrative data may be due to migration of short-term students, such as those coming to the United States for language training. However, it is a bit surprising that ACS does not seem to be underestimating tertiary-level students, and could be another area for future investigation, given there is relatively little documentation available about IIE survey methodology.

## A. Countries of Origin

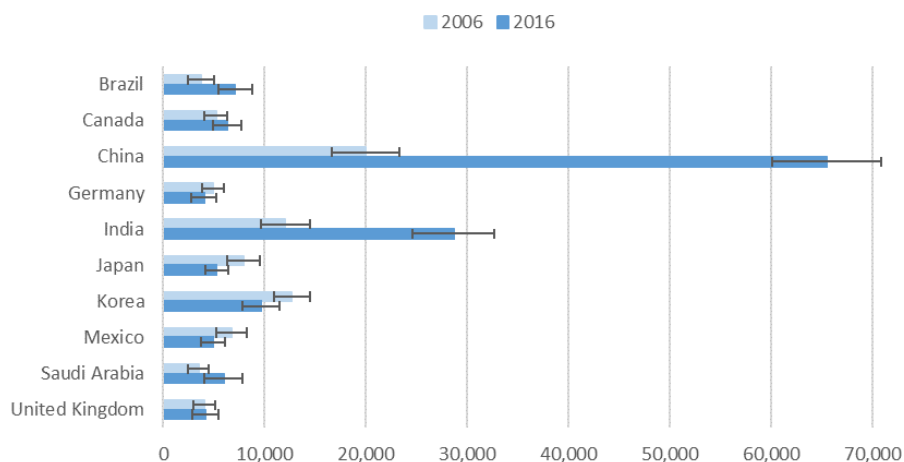
25. Previous research on the countries of origins of immigrants to the United States has shown a shift in the countries of origin of international migrants, with Mexico no longer the primary sending country, replaced by China and India (Jensen et al. 2015a). Figure 6 shows tertiary-level student migration in 2006 compared to 2016, by largest sending countries. Within the United States context, a handful of countries dominate college student migration, with many foreign students born in China<sup>8</sup>, Korea<sup>9</sup>, and India. China and India show the largest single-country growth in college students between 2006 and 2016. Four of the countries selected (Canada, Germany, Mexico, and the United Kingdom) show statistically insignificant changes in foreign-born student migration between 2006 and 2016. China and India's share of college student ROYA born in China and India increased from 20% to 41% between 2006 and 2016. This shift in countries is consistent with findings for total immigration flows to the United States and may contribute to the relatively higher share of Asian immigrants in the NIM estimates.

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<sup>8</sup> China includes students born on the mainland, Taiwan, Hong Kong, and Macao.

<sup>9</sup> The ACS collects country of birth responses as North Korea, South Korea, and Korea. In this paper, the Korea category includes both South Korea and Korea responses.

Figure 6. Foreign-Born Immigration of Tertiary-Level Students by Selected Country of Birth: 2006 and 2016



Data Source: U.S. Census Bureau, 2006 and 2016 American Community Survey 1-Year Estimates, 90% confidence intervals shown, countries sorted alphabetically

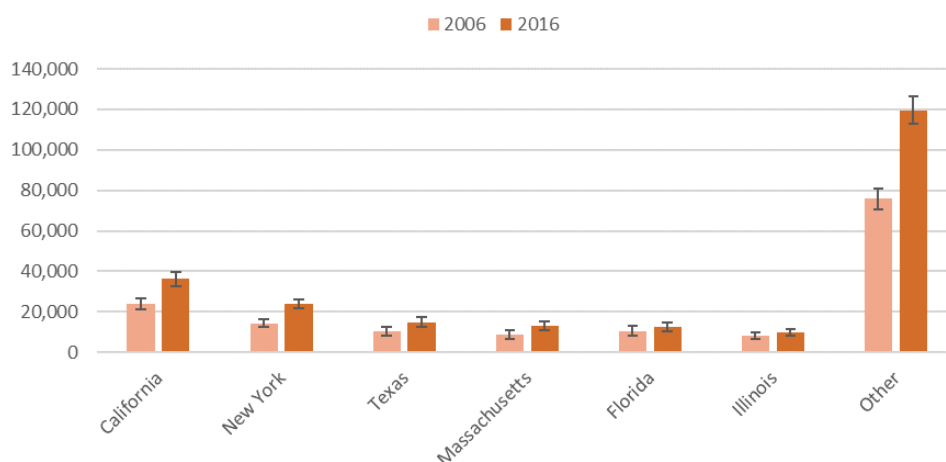
Note: China includes the mainland, Taiwan, Hong Kong, and Macao. Korea includes both South Korea and Korea responses in the ACS.

## B. Subnational Distribution of Tertiary-Level Student Migrants

26. The Census Bureau’s Population Division produces population estimates by age, sex, race, and Hispanic origin at the national, state, and county level, for which NIM is an important component. Given student migrants make up a sizeable proportion of the total immigrant flow to the United States, this can have important implications on where to allocate migrants at the sub-national level. Subnational distribution of immigrants to the United States are currently allocated via a proxy method, whereby recent migrant stocks at various geographies are used to redistribute national totals. This method does not take into consideration whether migrants are students and tends to lag sudden changes in the composition of migrant flows. To examine this impact, we next look at state-level analysis of tertiary-level student migration flows.

27. The six states shown in Figure 7 represent approximately half of total tertiary-level student ROYA for the nation in both 2006 and 2016. Many of the selected states are not statistically different from each other. In 2006, California was statistically different from New York and New York was statistically different from the remaining four states shown in Figure 7. California and New York were among the selected states with the largest, statistically significant, increases between 2006 and 2016. Texas, Massachusetts, Florida, and Illinois do not significantly increase between 2006 and 2016.

Figure 7. Foreign-Born Immigration of Tertiary-Level Students by Selected U.S. States: 2006 and 2016



Data Source: U.S. Census Bureau, 2006 and 2016 American Community Survey 1-Year Estimates, 90% confidence intervals shown

28. Of particular note is how much state-level ROYA is comprised of tertiary-level students. On the higher end, tertiary-level students comprised about 26% of total ROYA for Massachusetts and 17% for Illinois in 2006. On the lower end, the shares for Texas and Florida both were relatively low at 7% and 9% respectively in 2006, and did not significantly change in 2016. For some states, the tertiary-level student share of foreign-born immigration changes considerably over time. For example, tertiary-level students only comprised 9% of California's ROYA in 2006, but increased to 14% in 2016. New York and Illinois show a similar pattern as California, where the shares increased from 13% to 19% and 17% to 22% respectively between 2006 and 2016. This means certain states are becoming more attractive to student compared to non-student migrants. These patterns are likely to be more extreme at the county-level, where specific colleges and universities are located. Identifying these sorts of counties prior to redistributing our NIM components, could improve the accuracy of the age, sex, and race/Hispanic origin distribution of these migrants, and is an area of future possible research.

## VI. Discussion

29. This paper provides an overview of definitional and data considerations, as well as recent patterns, for student migration to the United States. These all have potentially important implications on our national and subnational population estimates. In general, international students are included in our NIM estimates, as long as they meet current residence criteria, living in the country for two or more months, or in a group quarters residence. While other data sources use different definitions, an inclusive definition for measuring international students in the United States would consider duration of stay, enrollment status, intent of move, visa status, as well as nativity and/or citizenship status.

30. International students have been steadily increasing in size and are an important sub-component of our foreign-born international migration estimates.

Administrative data have shown a rapid increase in the student population, which corresponds to our ACS estimates. However, while students make up a sizeable and increasing proportion of the total immigration flow, they do not explain all the growth in the foreign-born immigration component, which is likely due to growth in other immigration sub-groups as well. Further analysis might need to focus on tertiary-level student migration in order to better understand the student migration trends using both ACS and administrative data.

31. Results are inconclusive regarding the extent to which the ACS could be underestimating the foreign student population. Administrative data sources may overestimate flows of international students to the United States because these data reflect moves rather than migration events. A person may enter and leave the country multiple times during their course of study, but the migration event only occurs when they first entered the country to begin their study and when they leave after their studies have concluded. These are events where a change in usual residence occurs. While administrative data and ACS numbers are not directly comparable, due to universe coverage differences, measurement of moves across borders as opposed to migration events establishing usual residency, ACS residency requirements, lack of information on duration of stay, lack of visa status on the ACS questionnaire, etc., they do suggest that ACS is underestimating the foreign student population. This would be expected based on previous research, which found that ACS non-response tends to be higher for recent migrants (Jensen et al 2015b). However, ACS college student numbers do track well with other benchmarks, such as the IIE survey of college institutions, suggesting coverage could be more complete than suggested by administrative data. The degree to which ACS underestimates the foreign student population could be an area of future investigation and would have important implications for our NIM estimates.

32. Further impacting our NIM estimates are those migrants who leave the United States, our foreign-born emigration population. Based on visa status, students who graduate will then leave the country, resulting in “zero” net migration gain. However, many students remain in the United States after graduation, either to pursue additional education or to enter the labor force. It is very difficult to measure emigration, which the Census Bureau does by utilizing a type of residual methodology. If out-migration of these student age groups are not adequately considered, there is a risk that our estimates will age this college-age cohort forward during the decade, which can impact our overall age distributions. There are additional implications of student migration on the methods we use to distribute NIM at the subnational level, particularly at the county-level, where specific universities are located. Additional research needs to be carried out to assess the impact of student migration on our methods, such as disaggregating immigration and emigration by school enrollment status, and further comparing demographic characteristics of students and non-students.

33. The link between international student migration and labor migration is another topic of investigation, and could be examined as part of the Census Bureau’s involvement with the International Labor Organization (ILO) International Labor Migration Working Group, which is developing new definitions for labor migration. Finally, this work raised questions similar to those found while looking at the measurement of refugees/asylees to the United States (Schachter, et al 2016), and whether it would be possible to use administrative data to produce estimates of this sub-component of foreign-born immigration. Inclusion of administrative data would

bring up important questions about data quality, comparability and access, but are worth investigating.

## VII. References

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