Birth, Education and Taxes: An Immigrant's Perspective

November, 2020

1 Introduction

The focus of immigration reform has been on the skill composition of the immigrants allowed to come live and work in the United States. While working, like those who are U.S. born immigrants pay taxes, receive benefits. Outside of work they form families who's members go on to work. There is a large body of literature showing a correlation between the labor market outcomes of parents and children. This implies that the future benefits of an immigration policy which alters the skill composition of immigrants today can potentially be amplified through the children of these newly-formed families. This paper will establish patterns of immigrant fertility, intergenerational transmission of education, the earnings of the second generation of immigrants and ultimately the fiscal contributions they make.

Current U.S. immigration policy allows for approximately 700,000 working age immigrants to come to live and work in the U.S. annually. Close to 70% are admitted on the grounds that family members are already resident in the U.S. This immigration policy is indeed designed to have familial ties at the heart of it, unlike those in countries such as Canada or the U.K, which place greater weight on education, language ability and prior work experience. This has led many policy makers to consider the potential benefits for the U.S. of moving to a similar system. One facet of current policy that receives less attention is the per country cap on immigrants. Currently the total number of immigrants allowed in to the U.S. each year from any given cannot exceed 7% of the total number of immigrants allowed in to the U.S. Currently potential immigrants from India and China, traditionally some of the most successfully immigrant groups are bound by this per country constraint. Therefore, removing these per country caps while keeping immigration at the same level may provide additional positive outcomes from immigration to the U.S.

Any change to U.S. immigration policy has the potential to change both the demographics and the skill composition of the labor force. These changes have implications for labor markets through wages and for public finances through net tax revenues. Policy changes will not only have effects today, but in the future through the outcomes of immigrants' children, the second generation.

The bulk of the literature that explore the educational attainment, income, taxes paid and benefits received by immigrants and their children such as Storesletten (2000), Lee and Miller (2000) and Card et al. (2000) use data from the 1980 and 1990. In this chapter I present evidence that the profile of recent immigrant arrivals differs from arrivals in the 1980s and 1990s, in terms of both educational attainment and country of origin. This change in the composition of immigrant arrivals motivates

the use of updated data to compare the educational attainment and earnings of the second generation with their own parents and those with U.S. born parents. Further, I compare the taxes paid and benefits received by the second generation with their own parents and those with U.S. born parents. In addition, I will present evidence that these observations vary by the parental country of origin.

2 Data

2.0.1 Country of Origin

This paper explores fertility, intergenerational transmission of education, fiscal participation of immigrants and their children. These variables will likely differ by the immigrant's source country or for the case of children the source country of their parents. For some of the excercises I will perform showing individual country results are not informative therefore I will categorize country of origin into three categories: low-income, middle-income and high income. I reconcile this categorization with the World Bank definition by first combining the low income and lower middle income into one group and redefining the upper middle income as middle income. This implies that an immigrant from a "low income" country is one who comes from a country with a GNI (Gross National Income) of less than $4,035, "high income" as any country with a GNI above $12,476 and 'middle income' as any country with a GNI in between.

2.0.2 Immigration and Demographic Changes

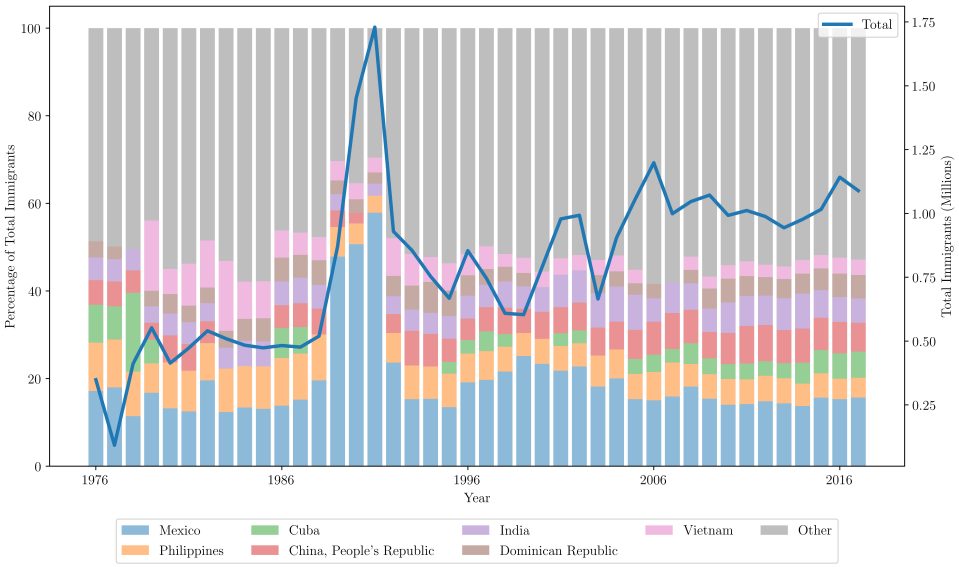
One of the most significant changes in immigration policy came in 1965 with the Immigration and Nationality act when the U.S. moved to a system of immigration that put emphasis on family based migration. Figure I shows how the number of immigrants has changed over the past four decades. During the 1970s and 1980s close to 500,000 immigrants arrived in the U.S. annually. This number spiked to over 1.75 million in the early 1990s before decreasing to around 750,000 for the rest of the decade. Since 2000 the number of immigrants arriving has remained steady at around 1 million per year.

Figure I also show the composition of immigrant source countries. The individual countries displayed on the graph were chosen because they have been the in the top 10 source countries for the majority of the past 40 years. To give some perspective each of these countries were in the top 10 source countries for 32 out of the 41 years in the sample, the country which has the next highest

rate of being in the top 10 was the U.K. which appeared only 8 times, all of which were in the early 1970s.

A consistent theme from the past 40 years is that Mexico has always been the top source of immigrants to the U.S. However, starting in the mid 90s China and India have been increasing their share at the expense of Vietnam and the Philippines.

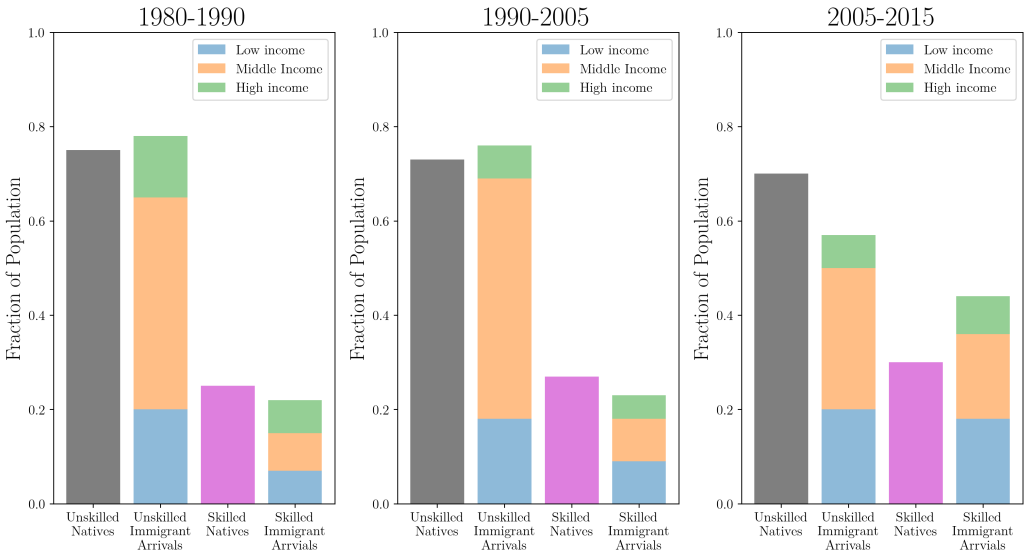
Figure I: Arrivals and Composition of Immigrants Since 1976



(a) Arrivals data taken from the Department of Homeland Security Yearbook 1976-2017

Figure I uses data from the Department of Homeland Security which doesn't disaggregate immigrant arrival numbers by educational attainment. To overcome this lack of granularity in the Department of Homeland Security date I use the 1990 Census 5% sample, 2007 ACS 3 year sample and the 2015 ACS 5 year sample (IPUMS USA) figure II shows how the profile of immigrant educational attainment and country of origin has changed over the past 35 years. Recently immigrants have a higher skilled to unskilled ratio than U.S. natives. Further, the country of origin composition has changed. While the number of immigrants from middle income countries has remained stable at close to 50% of all immigration, immigrants from low income countries now make up close to 40% of all immigrant arrivals, up from close to 30% in 1980 and 1990.

Figure II: Composition of Native Population and Population of Immigrant Arrivals 1980 - 2005



(a) Arrivals data taken from 1990 Census 5% sample, 2007 ACS 3 year sample and the 2015 ACS 5 year sample (IPUMS USA) figure II

(b) Low, middle and high income refers to immigrant country of origin

2.0.3 Fertility

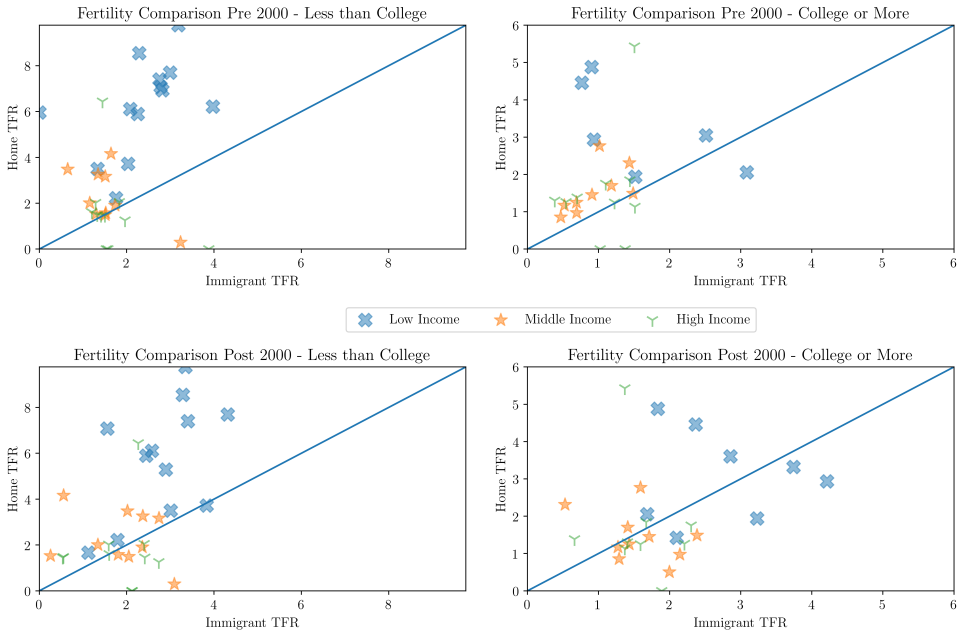
In economies with pay-as-you-go retirement systems, the worker-retiree ratio is an important variable in the funding of such systems. Given the close link between the worker-retiree ratio and demographics, which itself is determined in part by fertility rates, any change to immigration policy that can affect fertility rates can also affect the funding of retirement systems. In this section I will establish the fertility rates of different immigrant groups across time. It is well established that immigrants are a highly selected group. As such, we cannot just simply use the fertility rate of an immigrant's home country to approximate the fertility rate of an immigrant once in the U.S.

To analyze immigrant and native fertility, I calculate the TFR (Total Fertility Rate) for each immigrant's country of origin, that is, the number of children a woman can expect to have if she lives to the age of 45. To obtain the TFR, I first calculate source country-age-specific fertility rates, that is the number of children born to immigrant women from a specific source country. I then divide the births by the number of women in that age group, using five year age bins. To disaggregate by educational attainment, I separate observations into college or more and less than college. This gives a dataset of individual source country age-specific total fertility rates by educational attainment.

Figure III displays the comparison of the TFR between and immigrant and the U.S. and the TFR

of their compatriots who are still at home disaggreated by education and time period. In figure III if an observation is above the 45 degree line it implies that, immigrants have fewer children than their compatriots who stayed at home. In figure III for those with less than a college education regardless of time period these immigrants have fewer children than their counterparts who remain in their home country. For those with a college education figure III shows many observations close to the 45 degree line implying that fertility rates of immigrants with a college degree are similar to their home country counterparts.

Figure III: Comparison of Immigrant's Fertility With Their Home Country by Education and Over Time

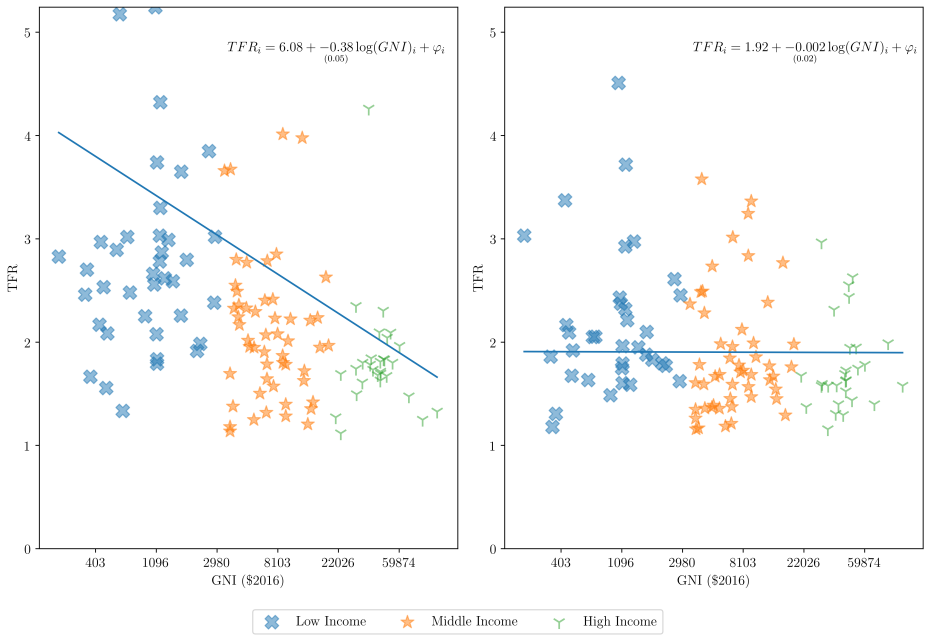


(a) Immigrant data taken from the 1970-2000 Census 5% Samples, 2007 ACS 3 Year Sample, 2012 ACS 5 year Sample and 2017 ACS 5 year Sample (IPUMS USA)

(b) Home country data taken using the public micro data from the Census of a number of countries, the full list is in the appendix

Figure IV displays the relationship between GNI and TFR with the line of best fit resulting from a regression of TFR on log GNI weighted using total number of observations collected when calculating TFR. Figure IV shows there is a great deal of heterogeneity in the TFR of immigrants and that there is a negative relationship between TFR and GNI for those with less than a college education. However, there is no relationship between TFR and GNI for those with college for more.

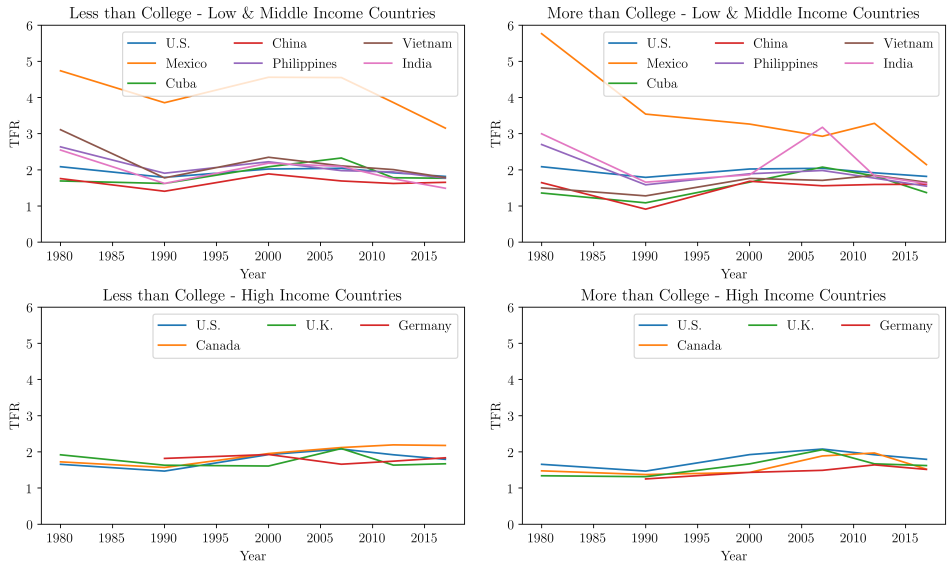
Figure IV: Immigrant Fertility by Education



(a) TFR is calculated by taking the mean of each country's TFR weighted by total observations for each year from the 2000 Census 5% sample, 2007 ACS 3 year sample, 2012 ACS 5 year sample and 2017 ACS 5 year sample (IPUMS USA) figure II

Given the heterogeneity in fertility rates and that the composition of immigrant source countries is dominated by a small group of countries in figure V I show the TFR over time for different education groups for the top immigrant source countries. This figure shows that there has been little change over time for immigrants from the top immigrant source countries with the exception of Mexico. Over the past 40 years figure V shows that Mexicans has had much higher fertility rates than other immigrant groups. However, figure V also shows that it is declining over time, for those with a college education their fertility is close to converging with those from other immigrant groups.

Figure V: Top Immigrant Source Country Fertility Over Time



Figures III, IV and V all suggest that there are differences across immigrant groups. To formalize this and to see if the TFR of immigrant groups is different from their U.S. counterparts I use the following regression:

$$TFR_{i,e,t} = \beta_0 + \sum \beta_{g,e,t} \times origin_{i,g,t} \times education_{i,e} + \sum \alpha_t \times Year + \epsilon_{i,e}$$

where $origin_{i,g}$ is a dummy for a country's income category and $education_{i,e}$ is a dummy for college or more and less than college. Table V displays the results of this regression. From Table V it is evident that immigrants with less than a college education on average have more children than their U.S. born counterparts. For example a woman from a low income country can expect to have 3.04 children compared to 2.04 for the U.S. Another conclusion from table V is that when measuring the fertility of immigrant groups, the inclusion of Mexico is important. Including Mexico in the regression implies that a woman from a middle income country can expect to have an additional 1.1 children.

From table V it is evident that immigrant women who have a college education would expect to, on average have fewer children than their U.S. born counterparts.

Table V: Results of Regression of TFR on Country of Origin

	Including Mexico		Excluding Mexico	
	Less than College	College or More	Less than College	College or More
Low Income	0.991***	-0.056	1.002***	0.056
	(0.076)	(0.153)	(0.047)	(0.079)
Middle Income	1.445***	-0.233	0.235***	-0.325***
	(0.052)	(0.146)	(0.049)	(0.083)
High Income	-0.041	-0.501*	-0.027	-0.391***
	(0.106)	(0.219)	(0.066)	(0.114)
Observations	426	426	420	420

2.0.4 The Second Generation

Any change in immigration policy today has the potential to also change the composition of the future labor force through the children of immigrants. To assess how any such policy change will affect the labor force and, in turn, its impact on public finances, I consider how the children of immigrants adapt to a country that is different from their parents'. Clearly, if the children adapted poorly and were limited to low paid work, this would put additional strain on public finances. To perform this analysis, I use data from the CPS Census supplemented by data from the GSS. Like Card et al. (2000) and Schoellman (2010), I show that the children of immigrants are a largely successful group and beneficial to public finances and that the magnitude is dependent on their parent's country of origin.

A second generation immigrant is defined as any child of two immigrant parents [1], whether born abroad or arriving in the U.S. before the age of 16. Currently there exists no large scale dataset that links the labor market outcomes of immigrants and their children. To overcome this problem I follow the literature, using a grouping estimation strategy as in Borjas (1993) to asses the educational and

[1] I also perform the analysis based on a second generation immigrant as having just one immigrant parent and find little difference.

labor market outcomes of parents and children. The estimation strategy is as follows: to measure the educational attainment and labor market outcomes of immigrant parents and of U.S. born parents, I use data from the 5% 1990 U.S. Census. I restrict the sample to fathers with a child under the age of 16 years old. The bound of 16 years old ensures that the immigrant child completes some of their education in the U.S. I then regress educational attainment and log hourly wages on source country and region of residence dummies, age and age squared as shown in 1.

$$y_{i,g} = \beta_0 + \sum_g \beta_g source_i + \sum_r \beta_r region_{i,g} + \beta_1 age_{i,g} + \beta_2 age_{i,g}^2 + \nu_{i,g} \tag{1}$$

With these parameters I can calculate the average schooling and earnings by country of origin at the age of 40. Further, with this sample I create a distribution of weights by age group and region of residence.

To measure the educational attainment and earnings outcomes of the second generation of immigrants and those with U.S. born parents, I use the CPS March supplement from 2007-2017 (IPUMS CPS) which records where respondents were born and where their parents were born, unlike the larger sample ACS and Census. I restrict the CPS (Current Population Survey) sample to ensure that every respondent was younger than 16 years old in 1990. If there are fewer than 30 observations for any individual parent country I drop all the child observations associated with that source country.

For each respondent in the CPS I assign the parental schooling and hourly earnings based upon the place of birth of their father. For both male and female respondents I regress the educational attainment and hourly earnings on father's birthplace [2] controlling for region, age, age squared and the. When performing each regression I use the age-region of residence weighting distribution created using the 1990 Census. Figures VI, VII and VIII display the mean predicted of each variable of interest when both the fathers and children are 40 years old, by country of origin.

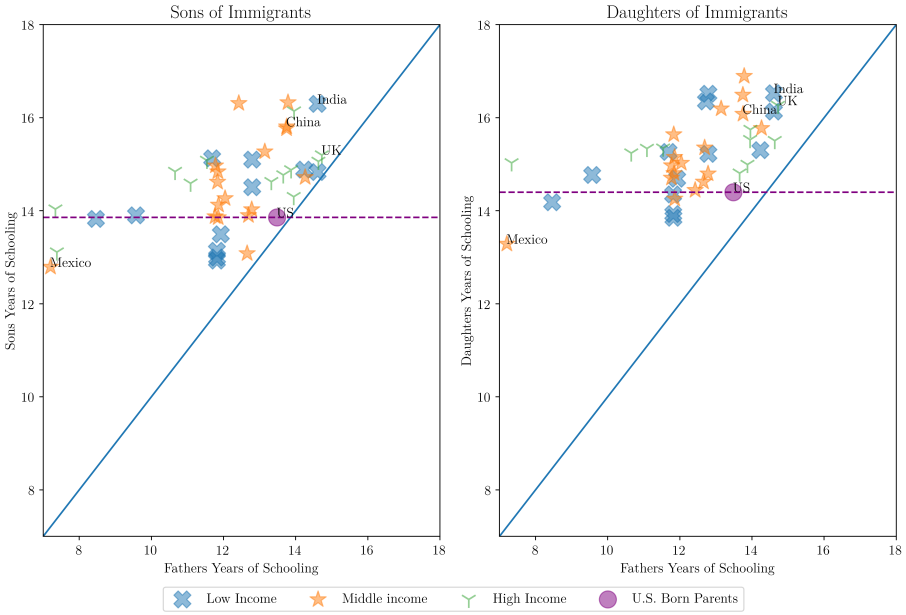
In Figure VI if an observation is above the solid line, it implies the child has achieved a greater level of schooling than its parents. If an observation is above the dashed line then it implies that that observation attains on average a higher level of schooling than their counterpart with at least one U.S. born parent. In Figure VI it is evident that even if the immigrant parents arrive with low levels of schooling, their children tend to attain on average higher levels of schooling.

For example, children of Mexican immigrants attain on average 13 years of schooling. This is less

[2] I also perform each analysis using data on mother's and find little difference with respect to educational attainment. On average daughters earn close to 5% more than their mothers, the son's earn 20% more.

than their counterparts with U.S. born parents who on average attain 13.7 years, but much higher than their parents who obtain just 7 years. Further, it is also evident that the majority of second generation immigrant groups attain higher average levels of schooling than their counterparts with U.S. born parents.

Figure VI: Years of Schooling of First and Second Generation Immigrants



(a) Child data from the CPS 2007-2017 (IPUMS CPS). Parent data from 1990 U.S. Census 5% sample. (IPUMS USA)

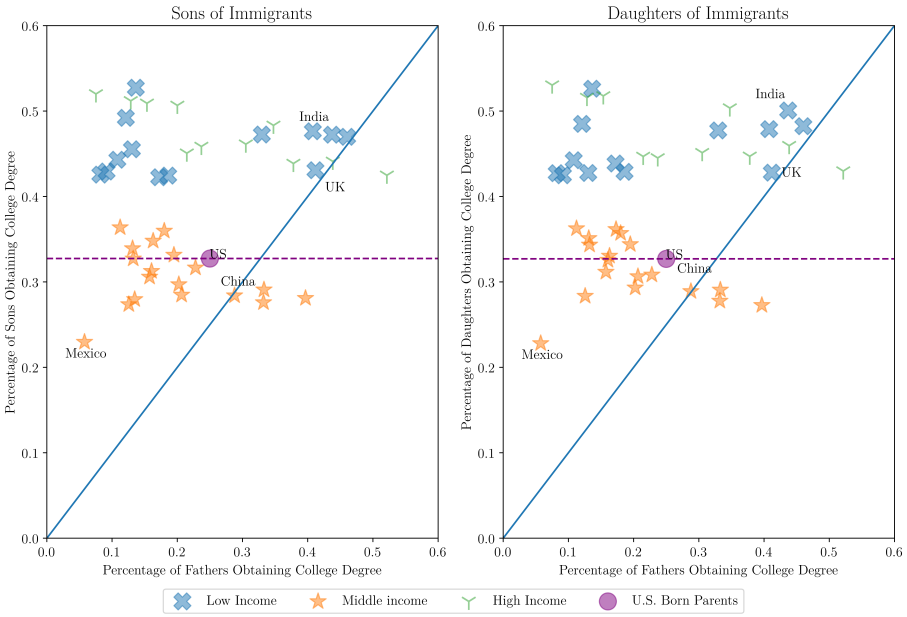
(b) Any point above the solid blue line indicates the child has a more years of schooling than the parent.

(c) Any point above the dashed purple line indicates the a child with immigrants parents has more years of schooling than their counterparts with two U.S. born parents.

Figure VII shows the percentage of second generation immigrants and their parents that completed college. On average the second generation of immigrants are attaining a college education at a higher rate than their parents and their counterparts with U.S. born parents. The notable exception is second generation immigrants with parents from middle income countries. While a greater fraction of this group attain a college degree than their parents, it is a lower fraction than their counterparts with U.S. born parents. Further exploration of the data reveals that many immigrants from middle income countries are completing some college, but not all four years, with many completing an associates degree.

Figure VIII establishes that the higher levels of education for children of immigrants does translate into higher hourly earnings, with the majority of second generation groups earning more than

Figure VII: College Attainment of First and Second Generation Immigrants



(a) Child data from the CPS 2007-2017 (IPUMS CPS). Parent data from 1990 U.S. Census 5% sample (IPUMS USA).

(b) Any point above the solid blue line indicates a greater fraction of the children finished college than the parent.

(c) Any point above the dashed purple line indicates a greater fraction of the children with immigrant parents finished college than their counterparts with two U.S. born parents.

their counterparts with U.S. born parents.

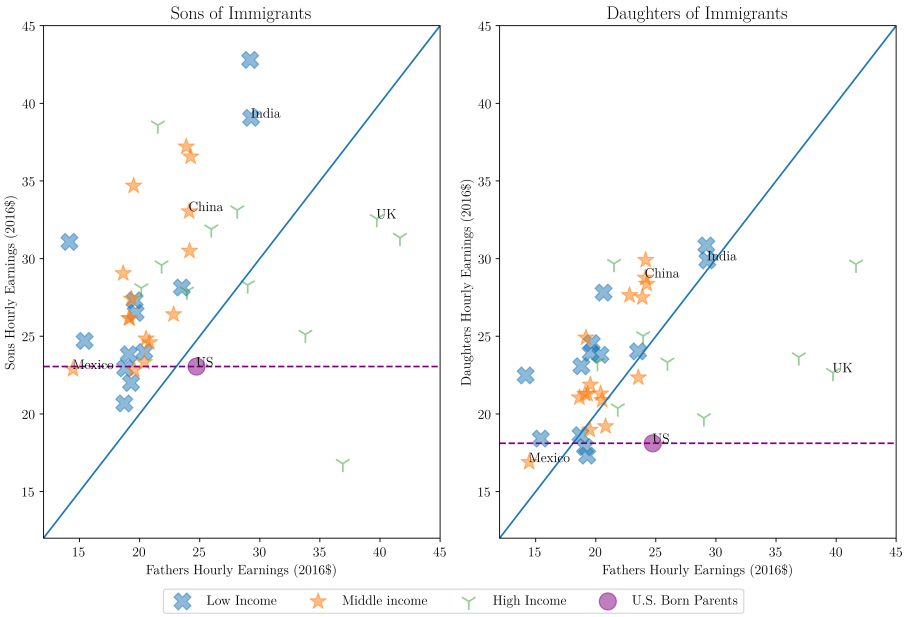
The above analysis presents the mean educational attainment and earnings of immigrant children unconditional on parental education. To supplement the above analysis and provide evidence that conditioning on parents educational achievement is important, I use the GSS (General Social Survey), a bi-annual, nationally representative survey with a focus on social attitudes in the U.S. Important to this analysis, it covers the respondents' educational attainment and country of birth as well as their parent's educational attainment and country of birth.

To calculate the probability of a child going to college conditional on their parent's education, I first merge the responses of each survey between 2000-2016, dropping any respondent under the age of 30 [3]. Merging over years gives a reasonable sample size for the children with immigrant parents [4]. I then split the sample into those whose parents either had, or had not, completed college. To obtain the probabilities of interest, I use a the results of a probit model with a dummy for whether the

[3] This is done to avoid having respondents who are likely to return to education.

[4] It also assumes that the transmission of education from parents to children did not change in these years.

Figure VIII: Hourly Earnings of First and Second Generation Immigrants



(a) Child data from the CPS 2007-2017 (IPUMS CPS). Parent data from 1990 U.S. Census 5% sample (IPUMS USA)

(b) Any point above the solid blue line indicates the child earns more per hour than their parent group

(c) Any point above the dashed purple line indicates the a child with immigrants parents earns more per hour than their counterparts with two U.S. born parents

child completed college as the dependent variable. The regressors are dummies for parent's nativity status, age, sex and region in which the child lived at age 16 and family income at age 16.[5] Table VIII displays the mean predicted values of the model with the standard errors.[6] In Table VIII we see that the inter-generational transmission of education for both immigrants and natives is similar. However, it does appear that conditional on their parents having a college education, immigrant children have a higher probability of completing college than those with comparable U.S. parents.

While the GSS does not report the specific country of birth for parents, I can break down the data by using ethnicity of the child as a crude proxy for parent's country of origin (conditional on the child having immigrant parents).[7] This gives the following options for parent's origin: U.S. born, asian-indian, asian-non-indian, hispanic, white and other. I then perform the same exercise that generated

[5]The family income variable is the child's assessment of their family income aged 16 with 5 options between far below average and far above average

[6]The predicted value is the probability of a child attaining a college degree, therefore the probability of not attaining a college degree is 1 minus this probability

[7]ethnicity to country of origin is not a 1:1 mapping. However, analysis of the top countries of immigrant origin to the U.S. show that in each country has a ethnicity that accounts for at least 80% of the population.

Table VIII: Intergenerational Education Transmission Matrices by Parent's Nativity

U.S. Born Parents

Parents \ Children	LC	C
LC	0.77	0.23
	(0.004)	(0.004)
C	0.37	0.63
	(0.009)	(0.009)

Observations: 12,462

Immigrant Parents

Parents \ Children	LC	C
LC	0.76	0.24
	(0.009)	(0.009)
C	0.32	0.68
	(0.02)	(0.02)

Observations: 1,596

(a) Data is from the General Social Survey 2000-2016

(b) LC indicates less than college, C indicates college or more

Table VIII for each ethnicity. To map the matrices to the low, middle, high income countries that are defined in 2.0.1 I do the following. I obtain a population distribution over ethnicity for each country group using the 2007-2017 CPS restricting the sample to second generation immigrants over the age of 30.[8] I then compute an average matrix for each country group using the matrices weighted using the population distribution calculated from the CPS.

Table VIII: Intergenerational Education Transmission Matrices by Parent's Country of Origin

Low Income

Parents \ Children	LC	C
LC	0.53	0.47
	(0.07)	(0.07)
C	0.15	0.85
	(0.04)	(0.04)

Medium Income

Parents \ Children	LC	C
LC	0.75	0.25
	(0.07)	(0.07)
C	0.44	0.56
	(0.1)	(0.1)

High Income

Parents \ Children	LC	C
LC	0.70	0.30
	(0.01)	(0.01)
C	0.35	0.65
	(0.04)	(0.04)

(a) Data is from the General Social Survey 2000-2016 and CPS 2007-2017 (IPUMS CPS).

(b) LC indicates less than college, C indicates college or more.

[8]The one exception is that I classify anyone with two asian-indian parents as asian-indian, since the CPS ethnicity does not distinguish between asian-non indian and asian-indian.

From Table VIII it is evident that there are differences in inter-generational transmission of education by an immigrant's country of origin. While the immigrant's transmission of education on average looks nearly identical to natives, when broken down by country of origin we do see starker differences. For those with parents from low income countries, the transmission of college education happens more frequently than for those of middle and even high income countries. This result is driven by the fact that close to 80% of the low income group identify as Asian-Indian or Asian-non-Indian - two groups for which the persistency of completing college between generations is high. It is a result that fits with the 'model minority' narrative of Wong et al. (1998).

2.0.5 Fiscal differences

In subsections 2.0.3 and 2.0.4, I establish that immigrants have on average more children than the current U.S. native population and on average those children outperform natives in terms of earnings. To assess the effects on public finances due to any change in immigration policy, we must also consider how much immigrants receive in benefits. The 1996 Welfare Reform Bill established the principle that immigrants are usually unable to claim any form of government transfers within the first 5 years after arrival in the U.S. There are exceptions, for example, immigrants themselves are eligible for the ETIC (Earned Income Tax Credit) as well as the CTC (Child Tax Credit). The children of immigrants are also eligible for Medicaid and Children's Health Insurance Program.

2.0.6 Transfers by Nativity

To assess the use of government transfers by immigrants, I use CPS data from 2011, 2013, 2015 (IPUMS CPS). I use the CPS given that it has a wide array of data on government transfer programs and identifies second generation immigrants.

Each observation is a household and I consider a household to participate in a government transfer program, y if any member of the household reports participation.

The country of origin is assigned to each household based upon the head of household's country of origin and can be either, low, middle, high or U.S. I assign the education of each household based upon the highest level of education received by the head of the household.

To establish the use of government benefit programs by immigrants compared to natives I use the following linear probability model where i denotes a household. The variable y is a binary variable of 0 or 1 if a household participates in a government transfer program. X_i contains information on

log hourly wages, age, age squared, country of origin dummies, and region of residence.

$$y = \beta_0 + \gamma \times X_i + \epsilon_i$$

The results shown in VIII compare the probability of participating in a government transfer program relative to U.S. native households with high school education. While household's headed by immigrants from low and middle income countries participate in government programs at a higher rate than U.S. native households with a high school education the differences are small. The exceptions here are child medicaid and EITC for which the differences are larger.

Table VIII: Probability of Participating in Government Transfer Programs

	Adult Medicaid	CHIP	EITC	TANF	SNAP	SSI
Constant	0.793**	0.943**	1.779**	0.143**	1.052**	0.150**
	(0.010)	(0.010)	(0.013)	(0.004)	(0.010	(0.005)
Low income - HS	0.023**	0.086**	0.132**	-0.005**	-0.008**	-0.007**
	(0.005)	(0.005)	(0.006)	(0.002)	(0.004)	(0.003)
Middle income - HS	0.007**	0.126**	0.158**	-0.004**	0.012**	-0.021**
	(0.004)	(0.004)	(0.004)	(0.001)	(0.003)	(0.002)
High income - HS	-0.067**	-0.010**	0.008**	-0.004**	-0.034**	-0.025**
	(0.007)	(0.006)	(0.009)	(0.002)	(0.005)	(0.004)
Native - coll	-0.056**	-0.056**	-0.066**	-0.005**	-0.041**	-0.013**
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Low income - coll	-0.040**	-0.036**	-0.026**	-0.009**	-0.039**	-0.013 **
	(0.004)	(0.004)	(0.004)	(0.001)	(0.003)	(0.002)
Medium income - coll	-0.050**	-0.016**	-0.012**	-0.008**	-0.030**	-0.021 **
	(0.005)	(0.004)	(0.005)	(0.001)	(0.003)	(0.002)
High income - coll	-0.086**	-0.036**	-0.035**	-0.008**	-0.036**	-0.028**
	(0.005)	(0.005)	(0.006)	(0.001)	(0.003)	(0.002)

Note : * Reject at 5% level, ** Reject at 1% level

Note : All specifications include controls for wage income, age, marital status and number of children

2.0.7 Taxes Paid

subsection 2.0.6 shows only one side of the story and makes the point that immigrant's on the whole are no more or less likely to participate in government transfer programs than those who are born in

the U.S. To fully consider immigrant's fiscal participation I must also consider the taxes paid and all programs that they can potentially partake in.

To this I consider the following transfers: EITC, CTC, workers compensation, supplemental social security, TANF, unemployment, veterans' benefits and foodstamps as well as Medicaid, Medicare and social security. Since 2008 the CPS only contains information on whether a respondent has received Medicare or Medicaid and not the value of the care received, I impute the value of Medicare received using the Annual Centers for Medicare Medicaid Service public use file, which breaks down the average per-capita Medicare expenditures by state. To impute the value of Medicaid, I use the Medicaid actuarial report from 2011, 2013 and 2015, values which are broken down into average per-capita spending on children, adults, disabled and the elderly. I only assign the value of disability-related Medicaid to a respondent if the respondent reports receiving supplemental social security. Further, I divide total government consumption, after subtracting defense and education spending, by the total population and treat that as a cash transfer to respondents. I treat the education spending as a transfer to those between the ages of 4 and 18 who were born in the U.S.

The taxes I consider are federal, state, FICA, property and sales taxes. I set sales tax paid equal to the state tax as in Evans (2017), which finds very little difference between the amounts paid. Each value of taxes and benefits is scaled, so that when aggregating each variable, I match data from 2015 national accounts.

With this dataset I create a lifecycle profile of taxes and benefits received at each age and by country of origin and parent's country of origin. With this lifecycle profile I calculate the ratio of present value of taxes paid to present value of benefits received as illustrated below.

$$\text{Tax to benefit Ratio} = \frac{\sum_j \left(\frac{1}{1+r}\right)^j Taxes_j}{\sum_j \frac{1}{1+r}\Big)^j Benefits_j}$$

I calculate this ratio for children of immigrants assuming they are born tomorrow. When calculating the ratio for immigrants themselves, I assume they arrive tomorrow at the average age of immigrants of their country of origin group. Table VIII presents these results. Further, I assume a discount rate of 3%. If the value in the Table is 1, it would imply that the net present value of taxes is equal to net present values of benefits and therefore increasing the portion of that group would have no effect on aggregate public finances.

From Table VIII it is clear that there are differences in the contributions to public finances, within the cohorts of both first and second generation immigrants and compared to those with two U.S. born parents. The second generation of immigrants with high school education have a similar tax-benefit ratio compared to those with U.S. born parents at 0.4. The bigger differences become evident with the second generation that completes college. For each of the three categories of second generation immigrants, they have a higher tax benefit ratio than their counterparts with U.S. born parents.

Given that the U.S. does not bear the cost of education for the first generation immigrants, it is not surprising that the tax-benefit ratios are higher for those with a college education. However, the opposite conclusion can be reached for the high school educated first generation. Table VIII gives a snapshot of the contribution of different groups to public finances.

Table VIII: Lifetime Tax to Benefit Ratio by Country of Birth and Parent's Country of Birth

	Less than College	College
Two U.S. born parents	0.40	1.22
Second generation		
Low income	0.40	1.67
Middle income	0.33	1.33
High income	0.47	1.44
First generation		
Low income	0.45	2.19
Middle income	0.40	1.83
High income	0.55	2.57

(a) Data is from CPS 2011-2015 (IPUMS CPS)

(b) Present value of both taxes and benefits is calculated assuming a 3% discount rate

While informative, table VIII masks the heterogeneity in how much immigrants and their descendants will pay in taxes, based on the arrival age of the immigrant. For a more comprehensive understanding of what an immigrant and their descendants will contribute in taxes and receive in benefits over their lifetimes, based upon age of arrival we can use a generational accounting approach like Lee and Miller (2000) as well as Auerbach et al. (1987). The central idea behind generational accounting uses the inter-temporal government budget constraint

$$\sum_{s=0}^{D} P_{t,t-s} + \sum_{s=1}^{\infty} \frac{P_{t,t+s}}{(1+r)^s} = \sum_{s=t}^{\infty} \frac{G_s}{(1+r)^{s-t}} - W_t \tag{2}$$

$P_{t,k}$ is the net tax payment in time t of birth cohort k and D is the age of death. Therefore the first term on the left hand side is the net tax payments by the current generations that are alive, the second term is the net contributions of future generations. On the right hand side is the discounted value of government consumption and net wealth in year t. The $P_{t,k}$ term can be rewritten as follows where T is the per capita tax payment and ψ is the population size of the birth cohort k at time t.

$$P_{t,k} = \sum_{s=\mu}^{k+D} \frac{T_{s,k}\psi_{s,k}}{(1+r)^{s-\mu}} \tag{3}$$

$$\mu = \max(t,k) \tag{4}$$

Equation 2 can be split further into the following equation where N represents natives and I immigrants.

$$\sum_{s=0}^{D} (N_{t,t-s} + I_{t,t-s}) + \sum_{s=1}^{\infty} \frac{(N_{t,t+s} + I_{t,t+s})}{(1+r)^s} = \sum_{s=t}^{\infty} \frac{G_s}{(1+r)^{s-t}} - W_t \tag{5}$$

Similarly I obtain the following expression

$$I_{t,k} = \sum_{s=\mu}^{k+D} \frac{T_{s,k}\psi^I_{s,k}}{(1+r)^{s-\mu}} \tag{6}$$

$$\mu = \max(t,k) \tag{7}$$

In this equation the $\psi^I_{s,k}$ will represent the mortality and changes in the immigrant population. Given that wages for immigrants vary by education level, age of arrival and country of origin so will the $T_{s,k}$ term. Further, for second generation immigrants it will also depend on their parents' education and country of origin as outlined in subsection 2.0.4. To parameterize the net tax payments $T_{s,k}$ I use the same data from the CPS as I did for the cross-subsectional exercise. Further, I calculate the NPV (Net Present Value) value of each immigrant and their descendants, assuming they cannot receive any benefits for the first 5 years after arrival and a maximum age of arrival at 50. I limit the age of arrival to 50 so that they can collect a social security payment and only 5% arrive after the age of 50. I calculate the NPV assuming a 2%, 3% and 4% discount rate. I also assume productivity increase of 1% and increases in Medicare and Medicaid costs of 0.8% above increases in GDP as per CBO(2018). As part of this exercise I calculate the contribution not only of the initial immigrants themselves, but also of their descendants.

To do this I calculate the NPV of the descendants and multiply it by the fertility rate of each immigrant as calculated in subsection 2.0.3. Finally I take survival probabilities from the multiple death and mortality data.

Figure IX: NPV by Age of Arrival and Country of Origin - College or More

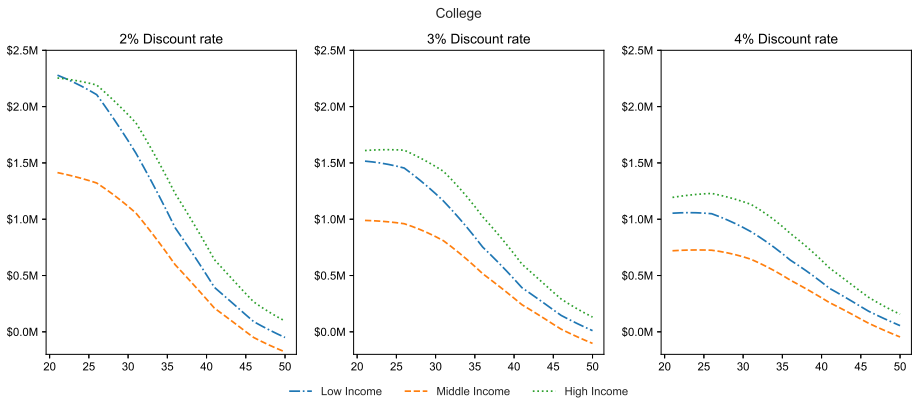


Figure X: NPV by Age of Arrival and Country of Origin - Less than College

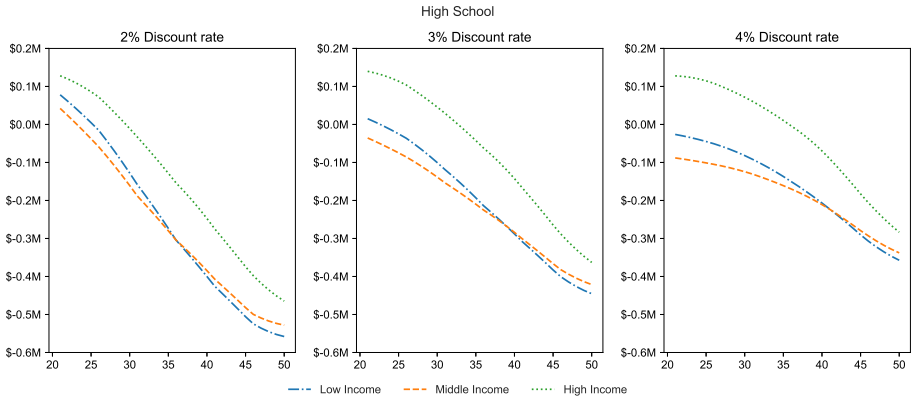


Figure IX shows that the net present value for immigrants with a college education or more have a positive net present value at almost every age of arrival and country of origin. There are however significant differences between the the different countries of origin, with those from high income countries having a net present value of over $2 million and those from middle income closer to $1.5 million. These findings are consistent with Orrenius (2017) who finds that the net present value for immigrants with a college education has increased since Lee and Miller (2000) paper. In addition it is also consistent with the findings of Lagakos et al. (2018), that returns to experience and education are highly heterogeneous by their country of origin. Therefore if wages are different then so will be taxes paid and benefits received.

Figure X shows that for those with less than college education the net present value is negative at nearly every age of arrival. Unlike those with a college education or higher there is less dispersion between countries of origin.

Common to both the college educated and high school educated is that the net present value is highly sensitive to the assumed discount rate. Figure IX and figure X would indicate that only allowing young college educated immigrants would be preferable from the perspective of a current U.S. resident.

3 Conclusion

In this chapter I establish a number of facts related to the fertility, educational attainment and fiscal participation of immigrants and their offspring, the second generation.

First that the fertility rates of immigrants from low and middle income countries are higher than

those from high income countries. Second the children that immigrants do have tend to outperform their own parents both in terms of educational attainment and earnings. Further, the second generation of immigrants outperform their counterparts with U.S. born parents and that the performance of the second generation is correlated with their parents source country. Immigrants who attain a college education contribute more to public finances more than immigrants without a college education and far more than those with U.S. born parents with a college education. Unsurprisingly given that the second generation who attain a college degree earn more than their counterparts with U.S. born parents they contribute more to public finances. However, they contribute less than their parents since the second generation require educating in which is a substantial burden to public finances.

In this chapter I am the first to establish that these results are heterogeneous with respect to the original immigrant parent's source country. This is of relevance given that the composition of immigrant source countries and educational attainment has changed substantially since 1990 when many analyses of immigrant's fiscal contributions were done.

This chapter outlines the fiscal participation by various groups residing in the U.S. and suggests that some groups contribute more than others, to fully understand the effects of changing immigration policy and how those contributions would change we need to understand the effects that immigrants will have on wages and ultimately tax receipts. These effects will be outlined in chapters **??** and **??**.

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Appendix

A List of Countries Used for International Fertility Comparison

Below is a list of the countries and their Censuses used to create III from (IPUMS International)

Argentina 2010,2001,1991,1980,1970

Armenia 2011,2001

Austria 2011,2001,1991,1981,1971

Bangladesh 2011,2001,1991

Belarus 2009,1999

Benin 2013,2002,1992,1979

Bolivia 2001,1992,1976

Botswana 2011,2001,1991,1981

Brazil 2010,2000,1991,1980,1970,1960

Burkina Faso,2006,1996,1985

Cambodia 2008,1998

Cameroon 2005,1987,1976

Canada 2011,2001,1991,1981,1971

Chile 2002,1992,1982,1970,1960

China 2000,1990,1982

Colombia 2005,1993,1985,1973,1964

Costa Rica 2011,2000,1984,1973,1963

Cuba 2002

Dominican Republic 2010,2002,1981,1970,1960

Ecuador 2010,2001,1990,1982,1974,1962

Egypt 2006,1996,1986

El Salvador 2007,1992

Ethiopia 2007,1994,1984

Fiji 2007,1996,1986,1976,1966

France 2011,2006,1999,1982,1975,1968,1990,1962

Germany 1987,1971,1981,1970

Ghana 2010,2000,1984

Greece 2011,2001,1991,1981,1971

Guinea 1996,1983

Haiti 2003,1982,1971

Honduras 2001,1988,1974,1961

Hungary 2011,2001,1990,1980,1970

India 2009,1999,1987,2004,1993,1983

Indonesia 2010,2005,2000,1995,1990,1985,1980,1976,1971

Iran 2011,2006

Iraq 1997

Ireland 2011,2006,2002,1996,1991,1986,1981,1979,1971

Israel 1995,1983,1972

Italy 2011,2001

Jamaica 2001,1991,1982

Jordan 2004

Kenya 2009,1999,1989,1979,1969

Kyrgyz Republic 2009,1999

Lesotho 2006,1996

Liberia 2008,1974

Malawi 2008,1998,1987

Malaysia 2000,1991,1980,1970

Mali 2009,1998,1987

Mexico 2015,2010,2005,2000,1995,1990,1970,1960

Mongolia 2000,1989

Morocco 2004,1994,1982

Mozambique 2007,1997

Netherlands 2011,2001,1971,1960

Nicaragua 2005,1995,1971

Nigeria 2010,2009,2008,2007,2006

Pakistan 1998,1981,1973

Palestine 2007,1997

Panama 2010,2000,1990,1980,1970,1960

Papua New Guinea,2000,1990,1980

Paraguay 2002,1992,1982,1972,1962

Peru 2007,1993

Philippines 2010,2000,1995,1990

Poland 2011,2002,1988,1978

Portugal 2011,2001,1991,1981

Puerto Rico 2010,2005,2000,1990,1980,1970

Romania 2011,2002,1992,1977

Rwanda 2012,2002,1991

Saint Lucia,1991,1980

Senegal 2002,1988

Sierra Leone,2004

Slovenia 2002

South Africa,2011,2007,1996,2001

South Sudan 2008

Spain 2011,2001,1991,1981

Sudan 2008

Switzerland 2000,1990,1980,1970

Tanzania 2012,2002,1988

Thailand 2000,1990,1980,1970

Trinidad and Tobago 2011,2000,1990,1980,1970

Turkey 2000,1990,1985

Uganda 2002,1991

Ukraine 2001

United Kingdom,2001,1991

Uruguay 2011,2006,1996,1985,1975,1963

Venezuela 2001,1990,1981,1971

Vietnam 2009,1999,1989

Zambia 2010,2000,1990

Zimbabwe 2012

B Occupational Similarity By Experience Group

Table X: High transferablility Education Occupation Similarity Index

Education	0-5	5-10	10-15	15-20	20-25	25-30
American High School						
High transferablility College	0.23	0.28	0.35	0.32	0.27	0.18
High transferablility College STEM	0.19	0.22	0.24	0.26	0.23	0.16
High transferablility Child Education, U.S. College	0.33	0.34	0.34	0.35	0.37	0.39
High transferablility Child Education, U.S. College STEM	0.22	0.22	0.26	0.26	0.26	0.28
American College						
High transferablility College	0.51	0.56	0.61	0.57	0.53	0.44
High transferablility College STEM	0.34	0.40	0.41	0.45	0.41	0.30
High transferablility Child Education, U.S. College	0.65	0.70	0.68	0.73	0.74	0.75
High transferablility Child Education, U.S. College STEM	0.39	0.41	0.46	0.49	0.51	0.53
American College STEM						
High transferablility College	0.47	0.51	0.54	0.54	0.48	0.38
High transferablility College STEM	0.57	0.56	0.62	0.66	0.57	0.45
High transferablility Child Education, U.S. College	0.52	0.58	0.60	0.62	0.61	0.61
High transferablility Child Education, U.S. College STEM	0.60	0.66	0.68	0.71	0.72	0.73
American High School						
American College	0.46	0.44	0.44	0.44	0.45	0.45
American College STEM	0.39	0.37	0.37	0.38	0.39	0.38
American College						
American College STEM	0.62	0.64	0.67	0.69	0.68	0.68