

Working Paper No. 17-02

Wait Time for Permanent Residency and the Retention of Immigrant Doctoral Recipients in the U.S.

Pooja Khosla
University of Colorado Boulder

March 3, 2017

Department of Economics



University of Colorado Boulder
Boulder, Colorado 80309

© March 2017 Pooja Khosla

More than 65 percent of foreign doctoral recipients continue to stay and work in the U.S. after graduation. Using data from the Survey of Earned Doctorates, the Survey of Doctoral Recipients and U.S. Citizenship and Immigration Services (USCIS), this paper estimates the impact of wait times for permanent residency (Green Card Status) on the migration decisions of foreign doctoral recipients.

The topic of illegal immigration often dominates the U.S. immigration debate, but legal high skilled immigration is often overlooked. The proposed immigration reform of 2016, however, has prioritized reducing barriers for immigrant high skill workers to work within U.S. On approval, this bill would resolve the massive backlog of pending Green Card applications, and would allow temporary visa holders to switch jobs more easily while waiting for a permanent visa.

The United States Department of State publishes a monthly Visa Bulletin⁶, which lists cut-off dates for different immigration categories and countries of birth. The Jan 2016 EB-2 cut-off date for China is March 2012, for India is August 2008, and for all other countries it is Jan 2016 (current).

While waiting for GC, immigrants who remain in the U.S. must remain on the temporary work visa, and are subject to its restrictions on job mobility. If immigrants' GC applications are not approved before the expiration of their temporary visa and all its legal possible extensions, they may have to leave the country (Kirkegaard, 2007). The uncertainties attached to working on H-1B may make working in the U.S. after graduation less attractive for immigrants who face longer GC wait times.

Let us assume for simplicity that after graduation new doctoral recipients have three options: One, leave to home country immediately after graduation; two, stay temporarily within the U.S. and then go back to the home country; three, stay permanently in the U.S.

Case I: Let us assume that the work experience accumulated within U.S. does not have any additional value in the immigrant's home country, and that the cost of returning to home country increases over time. When the doctoral immigrants compare their expected life-time earnings in the U.S. and home country respectively, they will stay in the U.S. if expected life-time earnings within U.S. are higher; else they will leave immediately after graduation.

Now let us add delays in GC status for some immigrants to our assumption above. These delays will compel some immigrants to work on H-1B visas for longer durations; this will further restrict

employment opportunities within U.S. for the immigrants working on H1-Bs compared to other immigrants, lowering the expected life time earnings within U.S. compared to immigrants from countries with no GC waits. This could cause immigrant doctoral graduates from countries with long GC waits to exit the U.S. immediately after graduation at higher rates.

Case II: Here we assume that immigrant doctoral recipients receive positive returns to the U.S. work experience when they return to work in their home country. In this case, in order to maximize their life time earnings, these immigrants may choose first to accumulate U.S. work experience before returning to their home country. That is, there will be some temporary stays. Further, assuming that there are diminishing returns to accumulative U.S. experience, and the cost of transition back increases with time spent in the U.S., these temporary stays may prefer to exit U.S. at their early to mid-career points. With perfect information and no wait time for GC status, immigrant doctoral recipients choose their optimal stay durations in the U.S. to maximize their aggregate life time earnings. However, with the long GC wait time and the limitations on H1-B visas, the optimal stay duration of these immigrants will likely be

The SED annually surveys individuals graduating with research doctoral degrees from U.S. institutions. The SED response rate is around 92 percent. This dataset is a rich source of information on new doctoral recipients. The SED asks the recent doctoral graduates if they intend "to live, work, or study in the U.S. after graduation". I use this information to analyze whether the waiting period to procure a Green Card (GC) affects intentions to stay and work within the country after graduating from U.S. universities. I restrict my analysis to immigrants who received their doctoral degree between 1980 and 2010. The data includes both immigrant doctoral graduates entering U.S. as graduate students and immigrants entering U.S. as undergraduate students and then entering graduate schools for doctoral degrees. I identify "immigrants" in the dataset to be an individual who is either a naturalized citizen or a non-citizen. To identify native country, I use information on birth country, country of high school, and country where Bachelor's degree was awarded. In order to reduce miss-measurement of home country, only individuals having high school country same as birth country or country where Bachelor's was awarded is same as birth country or all three are same were included in the sample. In most cases (95 percent plus), birth country of individuals matched with either country of high school or country where Bachelor's degree was awarded.

The SED provides information on doctoral recipients' intentions to remain in the U.S. but does not follow recipients over time. The SDR is a biennial longitudinal data of doctoral recipients drawn from the universe of respondents in SED. A sample of newly minted doctorates is added to the sample every two years and a "maintenance cut" of older doctorates is conducted in order to keep the sample size relatively constant at around 30,000 per wave. I restrict my analysis to immigrant graduates only.

The analysis uses the 2010 and 2013 SDR waves; these waves use integrated design ensuring proper representation of PhD graduates from U.S. universities who live outside the U.S.⁸ The analysis uses the SDR 2010 and 2013 sample weights.⁹

GC wait times are calculated using the U.S. government's visa bulletins, which are available at the SDE %

it is clear from Table 2 that most doctoral graduates from China, India and Iran intend to stay and work in the U.S. after graduation¹⁰. An important thing to notice here is that China and India not only account for leading number of doctoral graduates, but these two countries also account for major proportion of graduates intending to stay and work in the U.S. Table 1 and Table 2 together indicate that there is a

In equation (1) our unit of observation is individual i , from country of origin c , graduating in survey year t . The dependent variable is an indicator variable where '1' indicates that the respondent intends to stay and work within US after graduation and '0' indicates that he or she plans to leave US after graduation.

The explanatory variable Expected Wait-time (EW) varies by immigrant's birth country c and year of graduation t . K_i is a vector containing demographic controls including age, age square, age at the time of entering PhD program, gender, and marital status. S_i is a vector of education and individual's quality controls which contains variables indicating school quality and education background. To measure quality, PhD programs are categorized into three groups using the National Research Council's valuations of Research Doctoral Programs, 2010¹¹. The ranking of undergraduate school is based on the similar algorithm as used by Maslous et al, 2010¹², which is also compressed into three categories. The vector also includes controls for change in field of education between undergraduate and masters, and

Next, the paper uses SDR (NSDR and ISDR) 2010 and 2013 data to evaluate how wait time effects the location decisions of immigrant doctoral recipients who have graduated from U.S. universities since 2001. This regression specification allows the impact of expected wait time at graduation to differ by time since graduation. This allows us to investigate whether the effect of GC wait time criterion of immigrant PhD recipients from U.S. universities is short term or long term.

$$I_{i,t} = \beta_0 + \beta_1 (GR_{i,t}) + \beta_2 (EW_{i,t}) + \beta_3 (C_{i,t}) + \beta_4 (Y_{i,t}) + \beta_5 (C_{i,t} \times Y_{i,t}) + \epsilon_{i,t}$$

(2)

In Equation (2), the dependent variable $I_{i,t}$ is an indicator variable, which is equal to '1' if immigrant doctoral recipient is located in the US and '0' otherwise. Immigrants are divided into four group intervals based on time since graduation are 0-2 years, 3-5 years, 6-8 years and 9-11 years. $GR_{i,t}$ is an indicator for immigrant's group interval (n) in the survey year (t). $EW_{i,t}$ is the estimated wait time for GC for individuals from country (c) graduating in year (g). The terms $C_{i,t}$ denote Survey * Cohort effects, allowing the cohort fixed effects to vary across surveys. The rest of the notations are the same as in Equation (1).

In this equation, β_1 's allow the effects of GC wait time at time of graduation to change with time since graduation. Differences in β_1 's across the four categories reflect both time and cohort effects. For instance, it is likely that for a particular cohort, the effect of wait time in year of graduation is different three years after graduation compared to six years after graduation. At the same time it is also possible that the impact of wait time three years after graduation is different for cohorts who graduated in year 2004 compared to those who graduated in year 2007.

Since we have two waves of the Integrated SDR data, 2010 and 2013, and additionally we have repeated observations of the same cohorts, this allows us to interact the $GR_{it} \times EW_{it}$ terms with an indicator to survey year 2013

$$K_{it} + S_{it} + \beta_1 GR_{it} + \beta_2 EW_{it} + \beta_3 (GR_{it} \times EW_{it}) + \beta_4 (GR_{it} \times Survey_{2013}) + \beta_5 (EW_{it} \times Survey_{2013}) + \beta_6 (GR_{it} \times EW_{it} \times Survey_{2013}) + \epsilon_{it} \quad (3)$$

Equation (3) is similar to Equation (2) but includes interactions of wait time with both graduation groups and survey year indicators. Our estimates of the coefficients will allow us to investigate whether differences in the coefficients in equation (2) are due to differences in (

indicates that more than half of these recent doctoral recipients are married at the time of receiving their doctoral degrees. The average age at the time of entering doctoral programs is between 29 to 33 years for these foreign born doctoral recipients.

Table 4 and Table 5 report the distribution of field of doctoral degrees for these foreign born doctoral graduates for selected years. Most popular fields of study among these doctoral recipients are Engineering, Social Sciences, Education and Biological/Medical. Over the years fields like Engineering, Computer Science and Biological/ Medical are gaining popularity whereas fields like Agriculture, Education and Social Sciences are losing popularity for these foreign born doctoral recipients.

Table 5 also indicates that most foreign born doctoral recipients (78 percent to 82 percent) in the SED surveys have received their doctorates from high ranked schools within the U.S. Further, 55 percent to 62 percent of these doctoral recipients have received their Bachelors' from high ranked schools, among them 85 percent to 93 percent have earned their Bachelors' from their home country that is the country of their birth³. The table also presents summary statistics representing quality of these foreign born doctoral recipients. More than 45 percent of these graduates were funded by teaching or research or other types of assistantships as graduate students. A very small fraction had funding from government, private sector or other sources.

Table 6 provides the estimation results from $\log(\text{ED}) = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Married} + \beta_3 \text{Foreign Born} + \beta_4 \text{High School} + \beta_5 \text{College} + \beta_6 \text{Graduate} + \beta_7 \text{Funding} + \beta_8 \text{Quality} + \beta_9 \text{Field} + \beta_{10} \text{Year} + \epsilon$

that each additional year of wait time to acquire GC status will lead to decrease in the probability of

desire to sponsor GC to add to permanency of the employment. Moreover, immigrants prefer to work with firms with immigrant friendly procedures. There is a less chance that the sample of high skill immigrants is affected by this issue.

The results indicate that an additional year of GC wait time decreases the probability of retention of fresh immigrant doctoral recipients (0-2 years since graduation) by 5.5 percentage points. The current (Jan 2016) predicted GC wait times from India and China are ten and six years respectively. This can decrease probability of retention of fresh graduates (0-2 years since graduates) from these two countries by half and one third respectively. However, the results indicate that the impact of GC wait time on the retention of immigrant PhD recipients is temporary and not persistent. For inmiQasept

Rt° nB

Country of Citizenship	Number of PhD Graduates Receiving SE Doctorate in the US for Selected Countries 1985-2010					
China	148	1213	621	2098	3388	3557

--	--	--	--	--	--	--	--	--	--

3365
(517)

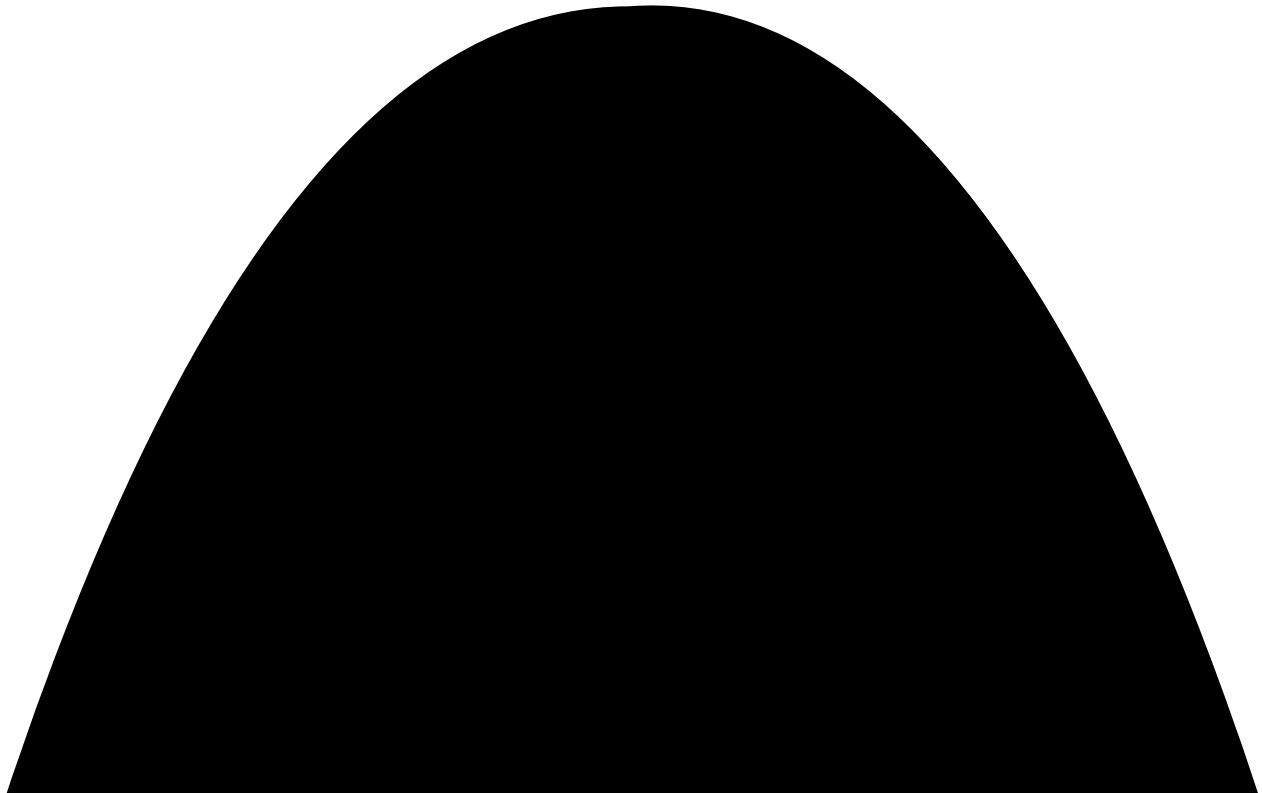
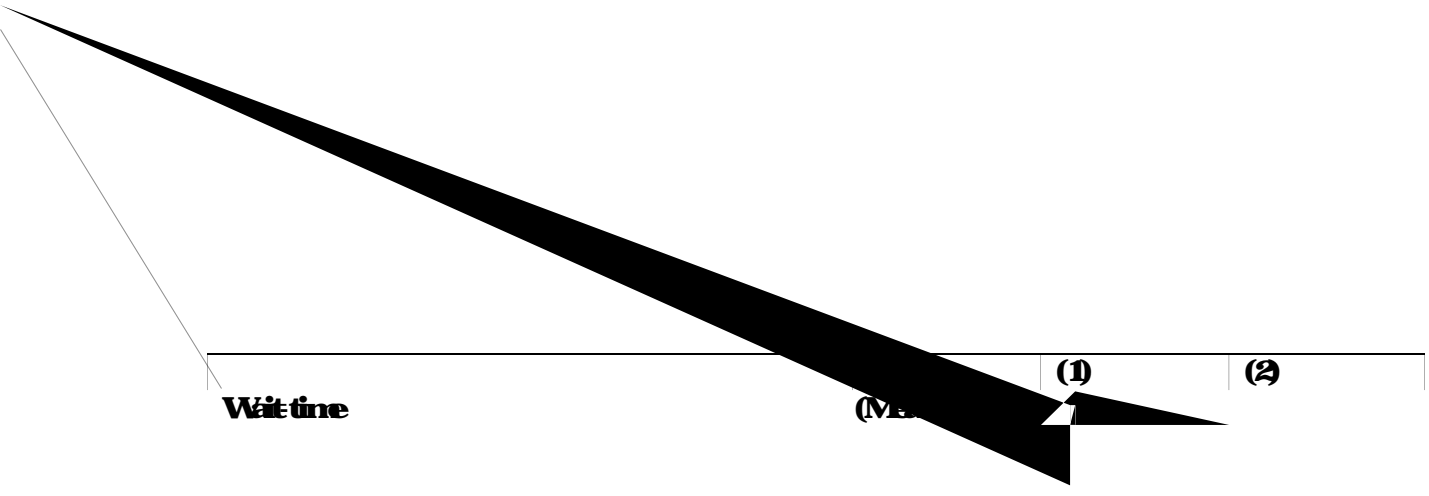
	.825	.816	.805	.797	.796	.783
	(.005)	(.004)	(.005)	(.004)	(.008)	(.008)
	.170	.178	.188	.196	.200	.212
	(.008)	(.004)	(.004)	(.004)	(.008)	(.008)
	.008	.005	.006	.005	.008	.008
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
	.612	.602	.608	.559	.608	.565
	(.006)	(.006)	(.006)	(.005)	(.005)	(.005)
	.233	.244	.240	.278	.237	.241
	(.005)	(.004)	(.004)	(.004)	(.008)	(.008)
	.208	.194	.194	.197	.194	.199
	(.005)	(.004)	(.004)	(.004)	(.008)	(.004)
	NA	NA	NA	.140	.127	.105
				(.008)	(.008)	(.008)
	NA	NA	NA	.613	.219	.180
				(.004)	(.008)	(.008)
	NA	NA	NA	0	.596	.633
				(.000)	(.004)	(.004)
	.076	.054	.054	.162	.201	.198
	(.008)	(.002)	(.004)	(.008)	(.004)	(.004)
	.463	.457	.454	.567	.617	.680
	(.004)	(.005)	(.005)	(.004)	(.004)	(.004)
	.020	.100	.080	.056	.056	.082
	(.004)	(.008)	(.004)	(.004)	(.004)	(.004)
	.494	.502	.504	.546	.478	.505
	(.006)	(.005)	(.005)	(.005)	(.004)	(.004)

	(1)	(2)	(3)
Wait time	-.011*** (.003)	-.012*** (.003)	-.012*** (.003)
Survey Fixed Effects	Y	Y	Y
County Fixed Effects	Y	Y	Y
Field of Study Fixed Effects	Y	Y	Y
Demographic Controls	Y	Y	Y
Individual Quality Control	N	Y	Y
Survey Fixed Effects * Field of Study	N	N	Y
Number of Observation	27565	25171	25171

Source: SED-DRF Files and USCIS

Notes: Here I use Regression Equation (1) and wait time in years. Sample includes all foreign born doctoral recipients from year 1980-2013 in the SED data

(Std Err: adjusted for 228 clusters in country)





1



“

