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Factors influencing career location preferences of international graduate students in the United States

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Using primary survey data, factors influencing preferences of international graduate students in the United States as to whether they prefer to stay in the United States or go back to their home country to start their careers are examined employing discrete choice analysis. Career opportunities and social climate are critical factors. Students prefer to start their careers in the country where they have more and better career opportunities, receive higher salaries, and have increased civil liberties. Differences between students who are sure and those who are not sure as to where they prefer to start their career are noted.

Keywords: economic development; human capital; brain drain

Introduction

Brain drain, the migration of skilled human capital, includes educated and trained persons who migrate from developing countries to join the workforce of developed countries and students who attend universities in developed countries but do not return home (Rao 1979). Migration of these two groups of skilled labor is a concern to both sending and receiving countries (Kwok and Leland 1982; Castle and Miller 2003; Chen 2006; Mariani 2007). Focusing on the second group of people, this study identifies factors influencing preferences of international graduate students in the United States as to where they prefer to start their professional careers – in the United States or in their home country. International graduate students constitute highly educated individuals; therefore, their decisions on where to start their professional careers have socio-economic impacts on both the United States and their home countries. US universities, for example, recruit talented students who often contribute to innovations attributed to the US workforce (Chellaraj, Maskus, and Mattoo 2005). Further, many developed countries, including the United States, the United Kingdom, Canada, and Australia offer 'talent for citizenship' programs to lure highly educated and/or talented labor to these countries (Shachar 2006). Attraction of these highly skilled immigrants has provided the United States with a cutting edge, even though the United States ranks near bottom among the major developed countries in science and mathematics among eighth-graders (Gordon 2004). On the other hand, sending

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countries, usually less developed countries, may be short of skilled labor necessary to meet their objectives (Kwok and Leland 1982).

Using primary survey data, factors that influence students' preferences of where they would prefer to start their professional careers are examined employing multinomial discrete choice analysis. Beside the United States and home countries, students were allowed to indicate they were not sure of their preferences as to where they prefer to start their careers. Previous brain-drain studies have not addressed this group of students. Students who are not sure of their preferences, however, may be more likely to be affected by policy interventions. Results indicate differentiated policies directed towards students with already defined preferences and those who are not sure may be necessary to attract students back to their home countries. Further, this study is an *ex ante*, before-graduation, analysis of students' preferences. Policies directed towards students before they take their first career job may be more effective than policies directed towards individuals that are already employed.

Brief literature review

Although the consensus is that the lack of human capital is a cause of economic underdevelopment (Stark 2004), the literature examining socio-economic effects of migration on sending countries has mixed conclusions. Some studies indicate that brain drain may be detrimental to the sending country because emigration deprives the sending country the increase in social welfare that the emigrants would have contributed (Miyagiwa 1991; Mariani 2007). Other studies argue that brain drain may not always be detrimental to the sending country, because emigration can increase the returns to education, which induces further investments in education and improvement of human capital in the sending country (Beine, Docquier, and Rapoport 2001, 2008; Miller 2007). Fan and Stark (2007a, 2007b), using a unified analytical framework, indicate that international migration of educated individual can have either positive or negative impacts on the educated human capital in developing countries. In particular, a developing country may have more educated individuals despite brain drain occurring, which benefits the economy.

More relevant to the current study is literature focusing on factors influencing migration of skilled human capital. Kao and Lee (1973, 513) concludes 'No single factor is sufficient to explain the drain, nor will a single policy reverse the flow.' Odenyo (1979) observes many factors, including interracial discrimination and lack of a welcoming community or network abroad, attribute to the return of African students who studied in the United States. Public rather than private sponsorship contributes to students returning home. Students who were first born, and therefore their father's successor, were more likely to return home. Positive valuation of job opportunities in the receiving country and poor political climate at home contributed to students not returning home. Postdoctoral students were more likely to pursue practical experience in temporary jobs and pay off their loans before they returned home. Das (1979) and Baruch, Gudwar, and Khatri (2007) find similar impacts of home country opportunities, family, and racial/ethnic ties on the return/non-return of international graduate students.

Kanbur and Rapoport (2005) note the network size at the destination decreases migration costs, therefore increasing migration. Similarly, Gottlieb and Joseph (2006) find that foreign students from some immigrant groups migrate to places where those groups are concentrated. Sixty percent of the Asian students surveyed by Oh (1973)

intended to stay in the United States for a substantial time after completing their studies. The students' non-return rate is primarily attributed to the favorable socio-economic conditions that existed in the United States. Using data from the Immigration and Naturalization Service for 69 countries, Bratsberg (1995) concludes that differences in the economic and political conditions explained the variation in foreign students' non-return rates. Students tend to return to rich countries and those countries close to the United States, although propensity to remain in the United States varies across countries.

Huang (1988) concludes that US immigration policy is an important and effective factor affecting the status adjustment from student to immigrant. Agarwal and Winkler (1985) note that immigration laws that make adjustment of visas possible play an important role in the decision to stay in the United States. Other factors such as political upheaval in the country of origin, racial and religious persecutions, and the avoidance of military service also affect non-return rates. They note that the increase in financial aid by most of the OPEC countries in late 1970s played a role in the increasing foreign student enrollment.

Survey and data

Primary data came from a survey of international graduate students enrolled at Texas A&M University (TAMU), College Station, Texas (Musumba 2006). The survey was conducted between 29 March and 25 April 2006 using a web-based questionnaire, with the web address being sent out via email. Two focus groups pre-tested the questionnaire. The final questionnaire consists of 28 questions on demographic characteristics, perceptions of home country attributes relative to the United States, and four alternatives as to where students prefer to start their careers (the United States, home country, country other than the United States or their home country, and not sure).

The usable sample constitutes 18% of the population of 2714 international graduate students enrolled at TAMU during spring 2006. Five hundred and ninety-seven students responded to the questionnaire, with 493 fully answering the questionnaire. Because the focus of the survey and study is to investigate whether international graduate students prefer to start their career in the United States or their home country, respondents were asked to indicate their perception differences on attributes between the United States and their home country. As such, it is necessary to excluded 23 respondents who chose a country other than the United States or their home country as the place they prefer to start their career. The analysis, therefore, is based on 470 respondents.

To provide background and context, the country of origin for international graduate students in the sample, population, and the United States is provided in Figure 1. The proportion of students from India, mainland China, Korea, Taiwan, Mexico, and Turkey in the sample is comparable with the percentage of international students enrolled in the United States (64% versus 60%), but is eight percentage points lower than the population. India had the largest number of students in the survey, as well as enrolled in TAMU and in the United States (35%, 46%, and 42%). The College of Engineering had the largest number of respondents (42%), as well as international graduate students enrolled at TAMU (46%) and in the United States (35%) (Figure 2).

Twenty-two percent of the respondents prefer to start their careers in their home country, 51% prefer the United States, and 27% are not sure. Respondents indicated relative differences between the United States and their home country for various

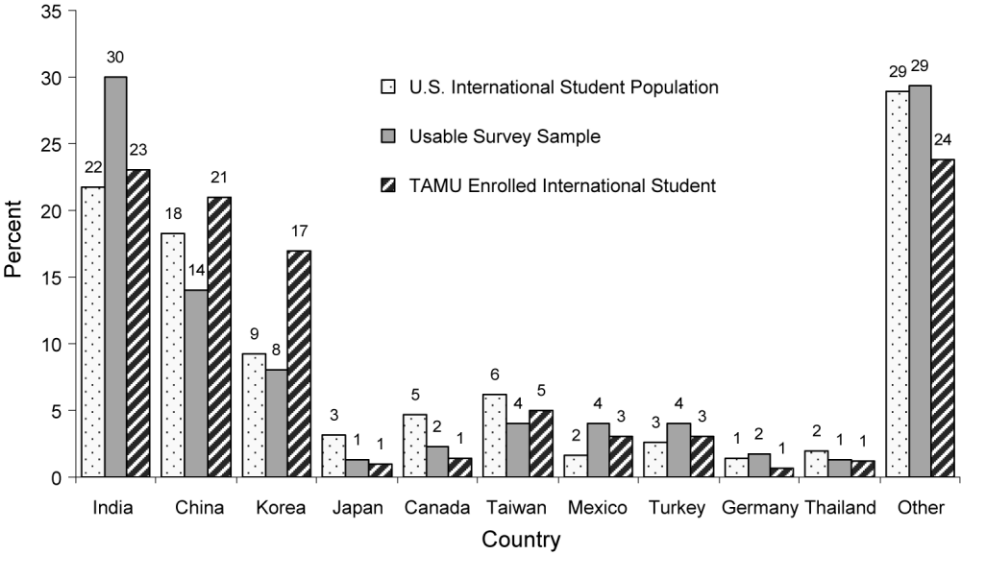

Figure 1 Country of origin profile of international graduate students in the sample, population and the United States.
Note: TAMU, Texas A&M University
Source: Institute of International Education (2006); survey; Office of Institutional Studies and Planning (2007).

attributes (Table 1). Respondents tended to indicate that the United States had more and a better variety of professional opportunities both in the private and public sectors,

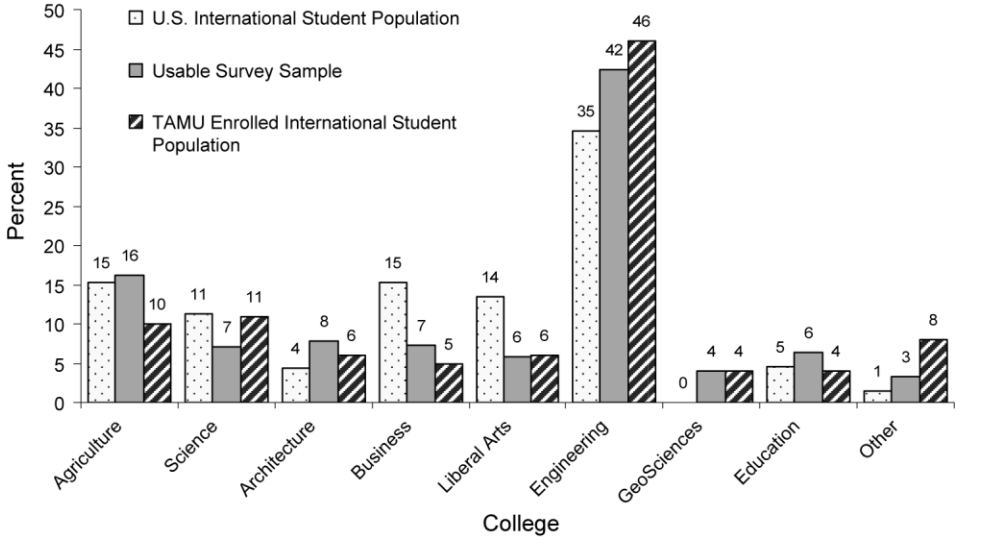

Figure 2 College profile of international graduate students in the sample, population and the United States.
Note: TAMU, Texas A&M University
Source: Institute of International Education (2006); survey; Office of Institutional Studies and Planning (2007).

higher political stability and public safety, better gender equality, better access to recreational facilities, cleaner air and water, better appreciation for cultural diversity, a higher standard of living, and more educational opportunities for their children. On the other hand, respondents tended to indicate that they had better access to health facilities, better networking with fellow country persons, and less racial discrimination in their home country. The perceived better access to health facilities in home countries may be an indication of the respondents' student status in the United States.

Estimation methodology

The theoretical basis for the use of discrete choice models is the random utility model. In this model, the indirect utility function is decomposed into a deterministic component, which is known up to some parameters, and a random component, which is unobservable. Students prefer to start their careers in the country where they obtain the highest level of perceived utility. If a student chose the not-sure option, it is

Table 1. Percentage of respondents indicating a particular number on a scale of the relative differences between the United States and their home country[a].

	Increasingly better in home country					Increasingly better in the United States			
	–4	–3	–2	–1	0	1	2	3	4
Political Index									
Level of political stability	2.3	2.8	3.2	3.2	36.0	11.3	13.6	12.8	14.9
Level of public safety	6.8	6.4	8.7	5.7	17.2	12.8	15.1	14.0	13.2
Civil Index									
Gender equality	3.2	2.13	3.8	4.5	34.3	17.9	15.5	11.59	7.2
Less racial discrimination	20.2	12.3	14.3	10.2	25.5	7.2	3.8	4.3	2.1
Cultural diversity	13.8	7.02	8.72	5.53	21.7	12.98	14.26	10.43	5.5
Career Index									
Private-sector opportunities	7.2	6.0	7.2	2.6	8.1	10.9	17.2	20.2	20.6
Public-sector opportunities	6.6	8.7	8.7	6.0	14.9	8.3	17.5	14.4	14.9
Networking with fellow country persons	24.0	11.7	13.4	6.4	24.9	4.3	7.7	3.4	4.3
Environment Index									
Access to public recreation facilities	5.7	4. 9	5.3	2.3	18.1	9.4	15.5	19.4	19.3
Cleaner air	6.4	6.2	5.1	2.1	3.8	8.3	18.3	17.9	21.9
Cleaner rivers and lakes	7.0	5.1	4.5	3.8	11.9	8.1	20.0	19.2	20.4
Living Index									
Access to health facilities	16.8	11.3	12.6	7.5	11.9	8.7	13.6	7.9	9.8
Standard of living	5.7	3.4	4.3	3.6	13.4	15.1	23.2	16.2	15.1
Education opportunities for children	6.6	7.5	7.5	5.7	19.8	13.4	16.0	12.8	10.9

Note: [a]Survey question was 'Please indicate your perception of the following factors. Consider the scale as a relative difference between the United States and your home country.'

assumed his/her utility is higher by holding off on the decision as to which country they prefer at the time of the survey. Random perceived utility is:

$$U_{ij} = V_{ij}(X_i) + \varepsilon_{ij} = \beta_j X_i + \varepsilon_{ij}, \tag{1}$$

where

V_{ij}, represents the deterministic component,

ε_{ij} is the error term,

i denotes individuals,

j represents the alternative – where $j = 0$ (student prefers to start their career in the United States), $j = 1$ (prefer to start in their home country), and $j = 2$ (not sure),

X_i is a vector of explanatory variables including individual characteristics and individuals' perceptions of country attributes, and

β_j is a coefficient vector.

A multinomial logit (MLOGIT) model that assumes the error terms are independently and identically distributed with a Weibull distribution is estimated.[1] Using preferring to start their careers in the United States as a base ($j = 0$), the probability of choosing alternative j for individual i in the MLOGIT model is (Greene 1997):

$$p_{ij} = \begin{cases} \text{prob}(Y_i = j) = \dfrac{e^{V_{ij}}}{1 + \sum_{j=1} e^{V_{ij}}} = \dfrac{e^{\beta_j X_i}}{1 + \sum_{j=1} e^{\beta_j X_i}} & \text{for } \mathrm{j} = 1 \text{ and } 2, \text{ and} \\ \text{prob}(Y_i = 0) = \dfrac{1}{1 + \sum_{j=1} e^{V_{ij}}} = \dfrac{1}{1 + \sum_{j=1} e^{\beta_j X_i}} & \text{for } \mathrm{j} = 0 \end{cases} \tag{2}$$

where Y_i represents the choice of student i. MLOGIT exhibits the behavioral property of the independence of irrelevant alternatives, meaning the odds ratios in the logit model are independent of the other alternative (Greene 1997). The Hausman test (Hausman and McFadden 1984) and a likelihood ratio tests are conducted for the appropriateness of this property.

Model specifications

The categorical dependent variable indicates whether a student prefers to start their career in the United States, their home country, or he/she is not sure. Independent variables include country, university, and individual characteristics. Without any doubt, unobserved heterogeneities among graduate students may affect their stated choices. The survey asked for information on individual characteristics to help reduce potential impacts of unobserved heterogeneity. This information is also used to identify those individual characteristics that affect preferences of graduate students on where they prefer to start their careers.

Country-related variables are expected annual salary in both the United States and home countries, a binary variable indicating whether a student comes from a developing or developed country, and indices of perceived differences on country attributes between the United States and home country. As shown in Table 1, country attributes are divided into five groups: political conditions measured by political stability and public safety; civil conditions measured by gender equity, racial discrimination, and cultural diversity; career conditions measured by private and public career opportunities, as well as the opportunity to network with fellow-country people; environmental conditions measured by access to public recreational facilities, along with air and water conditions; and living conditions measured by access to health facilities, standard of living, and education opportunities for children. Zero to one qualitative variables are use to represent respondents' perceived differences on the country attributes. To clarify, the dummy variable for political stability equals one if their home country is perceived politically at least as stable as in the United States, and zero if the United States is perceived more politically stable than the respondent's home country. Fourteen qualitative variables, therefore, are incorporated to measure country differences.

Respondents were asked to choose between income ranges that they expected to earn annually if they started their careers in the United States and in their home country. Based on the interval frequencies, empirical probability density functions of the expected salary in the United States and home country are estimated using the maximum entropy density method described in Wu and Perloff (2007). The estimated mean of the interval corresponding to the interval selected by the student on the questionnaire is used as a continuous variable. Fan and Stark's (2007b) Proposition 1 states that salary differences play an important role in international migration. However, incorporating only a salary difference may not be appropriate if the respondents reported salaries in the United States and their home country are not comparable. Many reasons, including cost of living adjustment, may make the values not comparable. To overcome this issue, expected annual salaries in both the United States and their home country are included in the model. If the absolute values of estimated coefficients associated with the two salary variables are statistically the same, one concludes a one-dollar increase in US salary has the same affect as a one-dollar decrease in the home country salary. If the absolute values of the estimated coefficients are statistically different, there is a need to incorporate both salaries separately.

University-related variables are qualitative variables indicating degree level, college enrolled, and funding source. Socio-demographic characteristics consist of number of years living in the United States, number of children, and binary variables indicating gender, martial status, visa type, whether the students has relatives living in the United States, whether the student has relatives back at home to take care of the respondents' parents, and whether the student found it difficulty to assimilate into the US lifestyle.

Results and discussion

Before detailed results are presented, the appropriateness of the MLOGIT model is discussed. As shown in Table 2, the χ^2 statistics for the Hausman tests, which compare the estimated coefficients based on the full sample with coefficients based on a subsample that excludes an alternative, are negative. Negative values provide strong evidence that the null hypothesis of the irrelevant alternatives property cannot be

rejected (Stata Reference 2007, 549). The data were also fitted using a nested logit model. The nested model included two nests: the first nest was a 'sure' nest, which included the two alternatives (choosing the United States or their home country to start their career); and, second, a 'not-sure' nest with only the not sure alternative. In this case, the nested logit model is obtained by assuming the vector of unobserved utility has a cumulative distribution of

$$\exp\left(-\sum_{k=1}^{K}\left(\sum_{j\in B_k} e^{-\varepsilon_{nj}/\lambda_k}\right)^{\lambda_k}\right)$$

where λ_k is the dissimilarity parameter measuring the degree of independence in unobserved utility among the alternatives in each nest (Train 2003). A value of $\lambda_k = 1$ indicates complete independence within nest k; there is no correlation in the nest. If $\lambda_k = 1$ for all k, then there is independence among all the alternatives in all nests, which suggests that the standard logit model is the proper specification rather than the general nested logit model. The χ^2 statistic for the likelihood ratio tests of $\lambda_k = 1$ for all k is 1.07, with a corresponding p value of 0.59 (Table 2). The null hypothesis of $\lambda_k = 1$ for all k is not rejected. Inference is that the MLOGIT is appropriate.

Estimated coefficients and associated marginal effects associated with the MLOGIT model are provided in Table 2. The MLOGIT model correctly predicts 61% of the observations. Estimations are preformed using a robust estimator within STATA version 10.

Country-related variables

As discussed previously, respondents indicated their perceived differences on 14 country attributes. For each attribute, a dummy variable indicating their home country is at least as good as the United States measured by this particular attribute is incorporated in the model. A positive coefficient associated with an attribute dummy in the home-country (not-sure) equation suggests that the probability of choosing the home country (not-sure) option increases if the home country is at least as good as the United States in this particular attribute. The results in Table 2 show that the perceived differences on country attributes do not play a statistically significant role in defining student's preferences between the not-sure option and the United States, except access to public recreation facilities. When choosing between the United States and their home country, students prefer to start their careers in the country with better public safety, more private and public career opportunities, cleaner water, and a better standard of living. Perceived differences on the other attributes do not play a statistically significant role in defining students' preferences between the United States and their home country.

The probability that international students prefer to start their careers in their home country increases by nine percentage points if the home country has better public safety than the United States (see marginal effects in Table 2). Six and 10 percentage point increases in the probability of preferring their home country are associated with increased private and public career opportunities in their home country, whereas the probability increases by eight points for cleaner water and by 11 points for better standard of living in their home country.

Table 2. Estimation results and marginal effects.

	Estimated coefficients		Marginal effects		
	Home country	Not sure	United States	Home country	Not sure
Country-related variables					
Political stability	0.291	0.298	–0.073	0.025	0.048
	(0.333)	(0.278)	(0.059)	(0.043)	(0.055)
Public safety	0.725**	0.149	–0.088	0.092*	–0.004
	(0.369)	(0.291)	(0.064)	(0.049)	(0.057)
Gender equality	0.04	0.097	–0.019	0.001	0.018
	(0.318)	(0.277)	(0.060)	(0.040)	(0.055)
Less racial discrimination	0.047	–0.237	0.033	0.017	–0.050
	(0.394)	(0.340)	(0.072)	(0.052)	(0.065)
Culture diversity	0.415	0.088	–0.052	0.054	–0.002
	(0.404)	(0.347)	(0.074)	(0.056)	(0.068)
Private career opportunity	0.532*	0.287	–0.093	0.060	0.033
	(0.312)	(0.296)	(0.062)	(0.043)	(0.059)
Public career opportunity	0.809**	0.087	–0.086	0.107***	–0.021
	(0.317)	(0.266)	(0.056)	(0.040)	(0.051)
Networking with fellow country persons	0.273	0.034	–0.028	0.033	–0.005
	(0.403)	(0.298)	(0.066)	(0.046)	(0.059)
Access to public recreational facilities	0.511	0.573**	–0.136**	0.041	0.094*
	(0.315)	(0.266)	(0.058)	(0.039)	(0.051)
Cleaner air	–0.329	0.563	–0.046	–0.074	0.120**
	(0.406)	(0.366)	(0.074)	(0.063)	(0.059)
Cleaner water	0.662**	0.030	–0.061	0.084**	–0.024
	(0.323)	(0.260)	(0.056)	(0.038)	(0.051)

Table 2. (*Continued*).

	Estimated coefficients		Marginal effects		
	Home country	Not sure	United States	Home country	Not sure
Access to public health facilities	0.275	0.004	−0.024	0.036	−0.012
	(0.320)	(0.273)	(0.060)	(0.038)	(0.053)
Standard of living	0.688**	−0.223	−0.034	0.112**	−0.078
	(0.343)	(0.322)	(0.067)	(0.052)	(0.058)
Education opportunities for children	−0.277	0.195	−0.008	−0.046	0.053
	(0.339)	(0.267)	(0.059)	(0.043)	(0.053)
Salary in the United States (US$1000)	−0.030***	−0.018*	0.006***	−0.003**	−0.002
	(0.012)	(0.010)	(0.002)	(0.001)	(0.002)
Salary in their home country (US$1000)	0.022***	0.004	−0.003	0.003***	0.000
	(0.008)	(0.008)	(0.002)	(0.001)	(0.002)
Developed country	−0.409	−1.241**	0.204***	−0.012	−0.191***
	(0.442)	(0.510)	(0.077)	(0.053)	(0.061)
University-related variables					
College – base enrolled in the College of Agricultural and Life Science					
Science	−0.967*	−0.192	0.103	−0.099**	−0.004
	(0.518)	(0.412)	(0.086)	(0.044)	(0.081)
Engineering	−0.891*	−0.030	0.079	−0.113*	0.033
	(0.521)	(0.403)	(0.087)	(0.061)	(0.080)
Business	−1.520**	−0.409	0.167*	−0.130***	−0.036
	(0.685)	(0.484)	(0.099)	(0.040)	(0.090)
Other	0.302	0.620	−0.129	0.007	0.122
	(0.608)	(0.515)	(0.116)	(0.074)	(0.109)

Table 2. (*Continued*).

	Estimated coefficients		Marginal effects		
	Home country	Not sure	United States	Home country	Not sure
PhD students	0.737**	0.851***	–0.195***	0.058	0.137**
	(0.355)	(0.317)	(0.063)	(0.040)	(0.056)
Funding – base financial support from the US Government and/or institutes					
Family financial support	0.595	0.672**	–0.160**	0.047	0.113*
	(0.379)	(0.319)	(0.071)	(0.050)	(0.065)
Home country	1.524***	0.747	–0.260***	0.217*	0.043
	(0.530)	(0.558)	(0.095)	(0.113)	(0.117)
Other	–0.544	–0.181	0.072	–0.056	–0.016
	(0.629)	(0.440)	(0.096)	(0.060)	(0.085)
Socio-demographic variables					
Female student	–1.341***	–0.164	0.131**	–0.152***	0.021
	(0.386)	(0.296)	(0.063)	(0.036)	(0.058)
Married student	–0.215	–0.914***	0.158**	0.010	–0.168***
	(0.361)	(0.292)	(0.063)	(0.045)	(0.049)
Number of children	0.473*	0.251	–0.081	0.051	0.03
	(0.277)	(0.278)	(0.060)	(0.032)	(0.052)
Number of years living in the United States	–0.376***	–0.166*	0.059***	–0.042***	–0.017
	(0.112)	(0.098)	(0.021)	(0.013)	(0.019)
Relatives living in the United States – yes	0.43	0.247	–0.077	0.046	0.031
	(0.292)	(0.245)	(0.054)	(0.036)	(0.047)

Table 2. (*Continued*).

	Estimated coefficients		Marginal effects		
	Home country	Not sure	United States	Home country	Not sure
Relatives to care for parents – yes	–0.028	–0.301	0.052	0.011	–0.063
	(0.427)	(0.337)	(0.076)	(0.051)	(0.070)
Visa status – student visa (F)	–0.63	0.036	0.058	–0.099	0.041
	(0.482)	(0.402)	(0.086)	(0.082)	(0.076)
Lifestyle – difficult	0.629**	0.162	–0.082	0.078*	0.003
	(0.296)	(0.249)	(0.054)	(0.040)	(0.048)
Constant	–0.218	–0.424			
	(0.932)	(0.867)			
Hausman tests					
(a) Excluding the US option	$\chi^2(34) = -2.57$				
(b) Excluding the home country option	$\chi^2(34) = -1.42$				
(c) Excluding the not-sure option	$\chi^2(34) = -55.29$				
Likelihood ratio test for the independence of irrelevant alternatives (IIA) after the nested logit model	$\chi^2(2) = 1.07$; $p = 0.59$				

	Actual frequency			
Predicted frequency	Home country	United States	Not sure	Total
Home country	57	15	17	89
United States	34	197	76	307
Not sure	13	26	35	74
Total	104	238	128	470

Note: *10% significant level, ** 5% significant level, and ***1% significant level. Figures in parentheses are standard deviations.

The coefficient associated with developed countries is not significant in the home-country equation, but it is significant and negative in the not-sure equation. These results indicate that there are no differences in preferring the United States or their home country between students from developed or less developed countries, but students from less developed countries are more likely to be sure about where they prefer to start their careers than students from developed countries.

Expected salary in their home country significantly increases the probability of choosing the home country relative to the United States, but it does not play a statistically significant role in distinguishing between students who are not sure and those who prefer the United States. Expected salary in the United States, however, plays a significant role in determining students' preferences between the United States and their home country, as well as between students who are not sure of their preference and those who prefer the United States. An increase in expected annual salary in a country increases the probability that students prefer to start their career in that country. If the expected salary in the United States (home country) increases by $1000, the probability of preferring the United States. (home country) to start their career goes up by 0.3 percentage points. To test size differences in the salary impacts on the preference between the United States and their home country, a test for the equality of the absolute values of the coefficients associated with expected income in the United States and their home county is conducted. The absolute value of these two coefficients are significantly different ($\chi^2(1) = 9.86$ and $p = 0.00$). A one-dollar increase in expected income in the United States decreases the probability of preferring their home county more than a one-dollar increase in expected home country income increases the probability of preferring to return home.

University-related variables

None of the college enrolled variables are significant in the not-sure equation. That is, there is no significant college-specific impact in differentiating students who are not sure about their preference and those who prefer the United States to start their career. Students in engineering, business, and science fields have a higher likelihood of preferring to start their careers in the United States instead of their home country relative to students in the College of Agriculture and Life Sciences. This may be attributed to the level of technological and scientific advancements in the United States relative to the students' home countries. The United States may be more attractive to students in these fields because of easier access to research funds and the ability to work with peers in their field, and, hence, tends to absorb many highly qualified workers (Mahroum 1999). Further, the United States also offers a variety of fields of study that may not be applicable in the home country.

Lien's (2005, 336) theoretical model defines global and local knowledge, where '… global knowledge is associated with newer high-technology production methods, the return from global knowledge in a developed country is much larger than the return to the local knowledge …' He concludes global knowledge may exacerbate the brain drain problem. Although not completely comparable, the empirical results provide support to Lien's model. Students in science and engineering, which fall more into the global knowledge category, are more likely to prefer to start in the United States, whereas students in agriculture (local knowledge) are more likely to prefer to return home. For possibly a similar reason, students in the College of Business also

have an increased likelihood over students in the College of Agriculture and Life Science in preferring to start their careers in the United States instead of their home country. PhD students are more likely to prefer to start their careers in their home country. One postulated reason is that highly educated individuals may perceive having higher influential job opportunities in their home country relative to the United States, because they are a more scarce human capital resource in their home country relative to the United States. However, because age is not included in the survey, age may be a confounding factor. PhD students are usually older, and older individuals may prefer to return home.

The results indicate that students tend to prefer starting their careers in the country from which their funding is received. If a student's primary source of funding is family or they are self-supported, their probability of preferring to start their career in their home increases by five percentage points over students who are funded by US institutions. Students supported by their home country have an increase of 22 percentage points in their probability of preferring to start in their home country over students funded by US institutions.

Socio-demographic variables

Females have a 15 percentage points higher probability of preferring to start their careers in the United States than males. Women may find that life is better in the United States with free expression, the ability to work, the availability of technological advancements, and the ability to pursue professional careers. In addition, women may be less likely to return to their home countries because it may entail losing their amassed wealth and their new found freedoms in the United States (Grasmuck and Pessar 1992).

The longer students stay in the United States, the more likely they are to prefer to start their careers in the United States. For each additional year a student stays in the United States, the probability of preferring start his/her career in the United States increases by approximately six percentage points, while decreasing the probability of preferring their home country by four percentage points. Extrapolating beyond career starting preferences to continuing careers, this result suggests that as students continue to live and raise their families in the United States, the less likely they are to return home.

Students who found it difficult to integrate into the US lifestyle have an increase of eight percentage points in the likelihood of preferring to start their careers in their home countries relative to students who found it easy to integrate into the US lifestyle. Universities with good social networks that help assimilate foreign students into the American lifestyle may be affecting student preferences as to where they prefer to start their careers, which is similar to findings in Baruch, Budhwar, and Khatri (2007).

Married students have an increase of 16 percentage points over single students in the probability of preferring the United States over the not-sure choice. Students who have relatives living in the United States are more likely to prefer to start their careers in their home country, which is opposite from the finding in Baruch, Budhwar, and Khatri (2007). One possible explanation is that having multiple family members in the United States may suggest a higher wealth or social status in their home country. Such status or opportunities may have associated with them increased opportunities back home. Without further research into the relationship between

families and where students prefer to start their careers, a more definitive explanation is not possible.

Conclusions and policy implications

Because the present study's results on factors influencing career preference are consistent with many *ex post* studies on actual career choices, one can conclude that students tend to act on their preferences. Thus, appropriate policies can be designed *ex ante* to lure graduate students back to their home countries. Policy implications depend on a person's perspective. The following implications are from the perspective that sending countries wish to have students return to their home countries. Results suggest differentiated policies are needed targeting those students who are sure of their preferences and those students who are not sure. Policies directed towards the not sure group may be more effective. This group is not a small group (in the sample, 27% of the respondents). Furthermore, the same policy may have multiple impacts on the preferences through the different variables included in the model.

Actions of US universities may inadvertently be contributing to brain drain. Admission of students to technology and science-oriented programs, providing funding to international students, and allowing students many years to complete their studies contribute to students preferring to start their careers in the United States. Creating programs that allow students to more easily assimilate into the US lifestyle also may contribute to brain drain. This is not to argue universities should not be providing these services, but rather there are unintended consequences of providing these services.

Career opportunities and social climate are critical factors in influencing students' preferences as to where they prefer to start their careers. Easier said than done, countries wanting to increase the return of students need to develop policies that decrease the relative differences in these factors between the home countries and the United States. In particular, policies that improve public safety, private and public opportunities, clean water, and living standards will have a positive impact on the return of the highly educated human capital. Lien (2008, 164) suggests that 'to reduce the brain drain, the domestic country must raise its wage or promote patriotism to reduce the perceived foreign wage.' Policies that enhance family and cultural values, along with improving gender equity would attract students to return home.

Several more specific recommendations can be made. First, as the number of years a student stays in the United States increases, the probability of preferring to start their career in the United States increases. Home countries may want to consider adjusting their funding policies toward more short-term education programs and funding the student for the duration of their education. Home countries may also want to promote and invest in 'exporting educational service' such as 'borderless education' (Lien 2006) and 'branch campuses' (Lien 2008). Such education formats do not necessarily require students to live in a foreign country to increase their human capital. The United States may consider limiting the amount of time students can attend US institutions. Much more unpopular policies would be directed toward letting single instead of married students and male instead of females leave the home country to attend school.

We envision several extensions to the present study. The most obvious is a follow-up of students' preferences and actual decisions. Time and limitations on email addresses (Texas A&M University removes student email addresses several months after graduation) does not allow such a follow-up with this data-set. Inclusion of students at other universities would increase the robustness of the results.

Further theoretical and empirical modeling on the unintentional impacts of university polices on the global and US societies and the impact of family relationships are warranted.

Note

1. We also estimated a nested logit model that assumes independence of irrelevant alternative holds among within each nest, but it does not hold in general for alternatives in different nests. Both Hausman tests and likelihood ratio tests fail to reject the irrelevant alternatives assumption, which suggest a standard multinomial logit model is appropriate. The detailed discussion is presented in the Results and discussion section.

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