

RELATIONSHIP BETWEEN ECONOMIC ACTIVITY AND THE SIZE OF THE
INTERNATIONAL STUDENT POPULATION IN OECD COUNTRIES

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By

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ABSTRACT

Education has become a global business and tertiary education is the biggest contributor. From 1975 to 2011, the number of international students enrolled in tertiary education among the OECD countries grew from 0.8 million to 4.3 million. This paper analyzes the relationship between the level of economic activity and the size of the international student population in OECD countries. The major finding is that both GDP per capita and real wages are positively related to the size of the international student population in a country. One of the main reasons may be that economic growth results in better educational resources and quality as well as better job markets, which are crucial factors affecting the decisions of international students in terms of where to apply. This study suggests that during periods of economic growth, policy makers should relax their immigration policy to fulfill increasing demand of international students. Immigration policy should also be modified during the economic downturn to overcome the contradiction between increasing demand of domestic students and decreasing educational funding.

Key words: GDP per capita, real wage, international students, education, immigration policy

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Background and Introduction

Education has become a global business and tertiary education is certainly the biggest player. From 1975 to 2011, the number of international students enrolled in tertiary education outside their country of citizenship grew from 0.8 million to 4.3 million among the Organization for Economic Co-operation and Development (OECD) countries (OECD, 2013). Despite the fact that technological improvements in transportation greatly contributed to the growth of the international tertiary education business, the main reason behind this still lies in the overall economic growth in both origin and recipient countries (Junor & Usher, 2008). While the economic factors affecting the international student outflow from the origin countries are primarily households' financial capability and the openness of the global education market, a series of economic-related factors also contribute to the level of international student mobility in the recipient countries.

It has become a common view that education is one of the key driving forces determining long-run economic growth (Bassanini & Scarpetta, 2001). This awareness of the importance of education grants it a strategic role in almost every country in the world. Long periods of economic prosperity and the emphasis on education in developed countries have resulted in better systems and higher quality. Healthy economic development also expands government capacity to invest education, which in return enhances the overall education development of the country. Moreover, quality higher education attracts students from all over the world (Russel, 2005).

Developed countries have been highly interested in attracting foreign students for several reasons. Financially, international students represent an important source of income for tertiary

education institutions. In most OECD countries, international students pay much higher tuition compared to domestic students (OECD, 2013). This becomes meaningful when an economic downturn cuts government funds for higher education and education institutions face adverse domestic demographic trends in terms of the number of potential students. By attracting international students, these institutions can overcome these financial constraints.

Besides financial contribution to education institutions, the international mobility of students is highly related to the increase of skilled and highly skilled workers in recipient countries' labor market. Some international students decide to stay in the host country after completing their program, which results in a skilled migration in many OECD countries (Tremblay, 2002). Benefited from skilled migration, several OECD countries have eased their immigration policies to attract international students (OECD, 2008).

Growing international student mobility reflects the increasing interest of countries in attracting individuals with the talents and skills needed to spur their own growth process. International students are likely to stay and work in the host country once they complete their programs. Consequently, they represent a valuable source of educated labor, especially because they have become familiar with the customs and the culture of the country while studying. It is not surprising that some OECD countries have explicitly implemented policies favoring the integration of international students in their labor markets (Bauer & Zimmermann, 2001). However, policies concerned with the management of international students can also go in a completely opposite direction. Policies in some OECD countries attempt to restrict students once they have graduated to protect their domestic job markets from international competition.

Compared to host countries, economic development in the origin countries also greatly contributes to international student mobility. Throughout history, sending talented students overseas for a better education has been a common option for less developed countries that are seeking rapid economic growth. While government study abroad programs remain one of the most important channels for students in less developed and developing countries to pursue better education overseas, economic growth has greatly expanded alternative channels. Positive economic development in origin countries increases personal wealth that makes more households financially able to send their children overseas (Lucas, 2004). In addition, education investment is positively correlated with economic growth, more available and accessible education resources are provided to the public in developing countries under good economic conditions.

Career opportunities are another main motivation for international student mobility. Better economic development creates better and healthier job markets with lower unemployment rates and higher incomes and wages. Previous migration studies have concluded that the earnings of individuals and return to skills in destination countries have huge impacts on individual migration decisions (Sjaastad, 1962; Borjas, 1987 & 1989). From a dynamic perspective, the changing economic activities in a recipient country, primarily the job market performance influentially affects the number of international students in that country.

In some origin countries, strong economic growth may still fail to satisfy workers' demand for jobs due to large population size. In countries like China and India, even though their economic growth has improved, job-seeking competition has only become more intensive because of the extremely large labor supply. Receiving a better education, or simply holding degrees from top-ranked universities overseas, can make workers much more competitive in the

labor market. In contrast when a recipient country's economy weakens (economic depression, lower wages, larger unemployment) the demand for education by local students increases, which most likely reduces the number of spots available for international students; if a country's economy grows substantially it may have greater capacity and demand for international students (Altbach & Knight, 2007).

The identification of key determinants of international student mobility is central to designing efficient policies aimed at attracting international students. These determinants pertain both to origin and recipient countries. Although related studies on key determinants are quite limited at the regional level, some common factors have been found in country-level analysis. Besides economic factors, international students tend to tie their choice of institutions to factors including the academic reputation of a particular institution or degree program, a program's flexibility on time spent abroad towards degree requirements, recognition of foreign degrees in the home country, school tuition, and limitations of tertiary education at home. Moreover, geography, historical ties, economic relationships, cultural aspirations, and immigration policy are also important contributors to the mobility of international students in developed countries (Beine and Ragot, 2014).

This paper explores the relationship between recipient countries' economic conditions and the inflows of international students. The objective of the study is to explore how economic activity in developed countries is associated with the number of international students enrolled in tertiary education in those countries. This paper explores this relationship by looking at the evolution of economic activity in 28 developed countries over a period of 10 years, from 2002 to

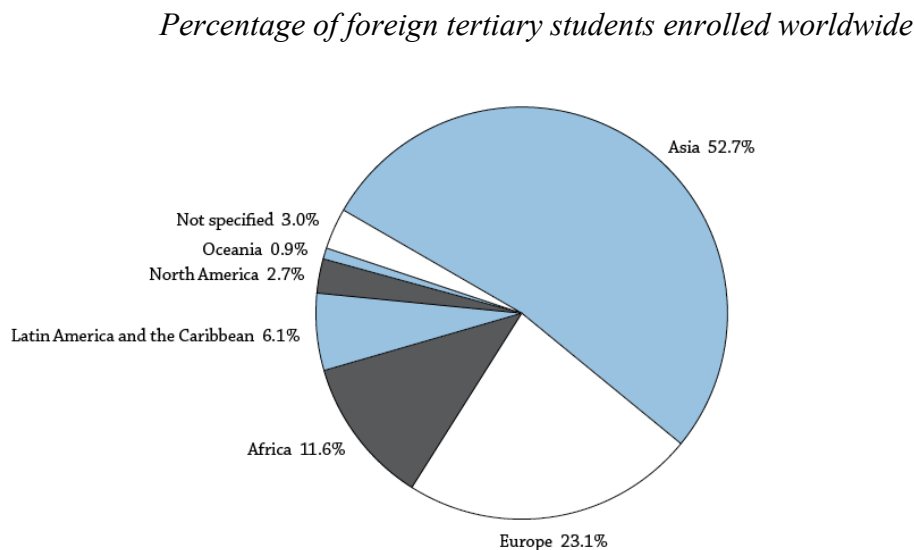
2011, which includes a period of economic crisis. The result of this study will help policy makers to better redesign and monitor their temporary and permanent immigration policies.

Descriptive Evidence and Literature Review

International student inflow to OECD countries

Increases in the number of international students in OECD countries reflect the expansion of tertiary education globally and the internationalization of societies and economies (Boarini and Strauss, 2010). Page (2007) confirms this through the estimation that in the 50s, 110,000 international students were enrolled globally. By the beginning of 2000, the number of international students has risen to approximately 1.9 million, and in 2004, the numbers was 2.7 million, an increase of 200% since 1985. These figures are expected to rise to 8 million in 2020 (Davis, 2009). In 2005, approximately 49% of international students came from Asian countries. The increase in demand for international education has resulted in certain countries that are English-speaking to take advantage of their well-developed higher education and other services that are knowledge-based. These countries are now more market focused and have begun making their education a soft services export.

Figure 1: Distribution of foreign students in tertiary education, by region of origin (2011)



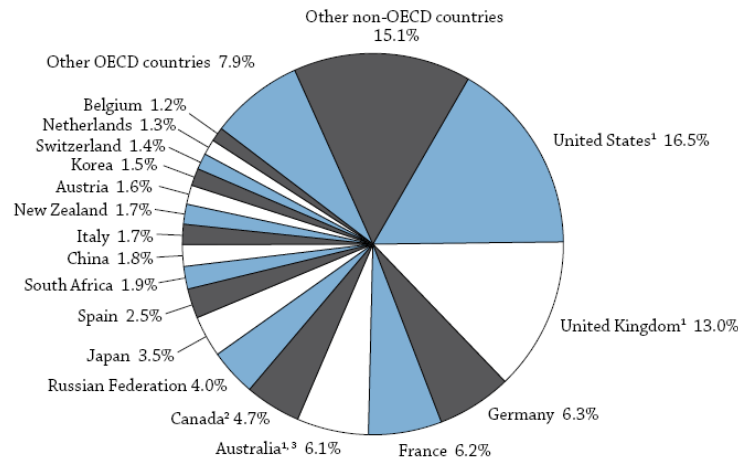
Source: OECD and UNESCO Institute for Statistics for most data on non-OECD destinations. Table C4.3.

Given that higher education is currently in a crisis period that involves cutbacks in government budgets (Obeng-Odoom, 2012), higher education internationalization has emerged as an income source for higher education financing within many countries. According to a study conducted by Chowdhury (2012), OECD countries are hosts to 85% of the world's international students, with about 33% coming from among the OECD member countries themselves. The higher education industry has revenues of up to 300 billion USD every year.

While a majority of international students study in OECD countries, higher education outside the OECD has stimulated its foreign students' intake. Approximately 50% of all international students were enrolled in the top five OECD destinations, including the US (17%), UK (13%), Australia, France and Germany (with 6% each). The US, UK and Australia host slightly above a third (36%) of higher education students enrolled throughout the world with the proportion being stable since 2000 (Jakobi and Teltemann, 2011). (See figure 1) However, the share of international students in some popular countries has gone down. For instance, the share of the US dropped from 23% in 2000 to 17% in 2011 (Bank, 2012). In contrast to this drop, international students in Korea grew by more than 17 times within the same period (Bank, 2012).

Figure 2: Distribution of foreign students in tertiary education, by country of destination (2011)

Percentage of foreign tertiary students reported to the OECD who are enrolled in each country of destination



Source: OECD and UNESCO Institute for Statistics for most data on non-OECD destinations. Table C4.4 and Table C4.7, available on line. See Annex 3 for notes

The rise in the number of foreign students can be attributed to the rise in the rate of participation from developing nations and to the fact that most employment positions in the world knowledge economy need educational qualifications beyond secondary education. The increase in the number of foreign students has led to the increase in competition in the enrollment market. Developing countries, for instance, India and China, which were in the past regarded as sending countries, continue to build their capacity for indigenous higher education and encourage their students to study within their country for the purpose of not losing them to the US. Yusuf (2013) highlights that China heavily invested in its higher education in the 90s with the objective of making their nine top institutions of higher learning world-class.

Factors affecting the enrollment size of international student population in OECD countries

Previous empirical studies discuss the motivations and determinants of student mobility. These studies concern either the international mobility of students or internal mobility, (i.e. the mobility of students between regions or states within a country). Many scholars often evaluate the determinants by an augmented gravity equation where data describing amenities are introduced in addition to the traditional determinants such as distance, GDP, and population. Distance always has a deterrent effect, but the effect of GDP is more ambiguous. Concerning international migration, Bessey (2007) studies the flows of international students to Germany. The stock of foreign students of a given nationality in the destination country and the flows of students with the same nationality seem positively correlated. This analysis does not however include variables characterizing the quality of higher education. Some survey analyses which take the prospective international student as the unit of analysis reveal that the discrepancy in education quality between a foreign degree and a domestic one is one of the main motivations for students to go overseas (Gordon and Jallade (1996); Aslangbengui and Montecinos (1998); Szelenyi (2006)). Moreover, Hao (2012) finds that the volume of merchandise trade between countries has a positive impact on international student enrollment. His findings also indicate that when considering developed countries (OECD) as possible destinations, international students from developing countries care more about economic factors than educational ones. He also argues that the job opportunity is an essential factor that attracts international students, and the host countries should pay more attention to this issue when attracting talent.

In addition, the reputation of higher education in a country and the programs offered influence the decision of which country to study in, and this includes the linguistic barriers,

immigration policies, and the cost of international higher education. Numerous countries now offer English for the purpose of overcoming linguistic obstacles. Nevertheless, the language or immigration policy may become either a barrier or bridge to foreign students. Different countries are teaming up on education policies that are coordinated for the purpose of making specific geographic regions more attractive to international students with the most influential and innovative region being Europe. Established in 1999, the Bologna process facilitates the convergence of higher learning across the EU. It has notable political support within the region and is applied to 4000 institutions of higher learning which host up to 16 million students (Siddiq, Nethercote, Lye and Baroni, 2012). The process is a commitment towards the harmonization and integration of higher education structures and systems among 45 countries in the EU. Davis (2009) claims that this process has enabled Europe to become a main competitor in the market for foreign students.

Mazzarol and Soutar (2001) point out that the quality of higher education is one of the main determinants considered by international students. Moreover, they claim that the desires to learn about a foreign culture, and the immigration possibilities after graduation are key determinants. In addition, DeVoretz (2006) claims that tuition fees and the quality of the education offered by higher education institutions have significant impacts on international student mobility. Similarly, Van and Veugelers (2009) find that, on the tertiary level, a high quality of the recipient country's education system has a positive and significant effect on international student mobility. However, another explanation is that the lack of educational opportunities in the home country drives student mobility.

The cost of higher education is also among the factors influencing the choice of study country. Lindsay and Pramod (2001) think that the per capita income gap between the outflow and inflow countries, exchange-rate adjusted tuition level, and the education quality of outflow countries are key determinants. The fees that the countries charge international students have an additional influence on the destination's attractiveness. Across the OECD countries, there has been a rise in the view of foreign students as a source of income and therefore a corresponding rise in fees for foreign students. In most of the OECD countries with available data, foreign students are charged more than domestic students. Only four countries worldwide required international students to pay differential fees prior to the 90s, and they included Britain which introduced the fees in 1967, Belgium in 1972, Australia in 1980, and Canada in various years depending on the province. Since then, most OECD countries have introduced differential fees for international students. In contrast, some OECD countries, for example, the French, declared equitable access to education and treatment of all students irrespective of their nationality (Siddiq, Nethercote, Lye and Baroni, 2012). Consequently, international students in these countries pay the same tuition as domestic students and the costs of higher education are very low due to massive government funds.

Although no empirical studies appear to have been conducted to explore the cross-country disparities in attracting international students, previous literature approached the topic in single country studies and from the perspective of international student mobility. Bessey (2007) finds in Germany's case that the importance of disposable income in the home country does not seem to be too large for students, while losing political freedom decreases migration flows significantly.

In 2013, Iange (2013) studies the relationship between return migration of international students and tuition fees. The study finds that international students usually understand the fact that they might eventually return to their home countries after graduation, even if they initially intended to stay. A change in students' perceptions of staying probability can affect their initial decision about whether to study abroad. Therefore, educational institutions take this behavioral response into consideration while adjusting the non-resident tuition fees. The study also finds that this behavioral effect can be dominant under certain conditions. In order to maintain international students' rates, cutting non-resident tuition fees can be the most effective option.

The number of international students of an inflow country also closely relates to the economic integration between countries, and the economic development and education level of the outflow country. According to Poot and Strutt (2009), international trade and talent flow are complementary and are getting more inter dependent. On one hand, international trade between outflow countries and inflow countries facilitates talent flow by indirectly lowering the flow cost. (Pederson et al. 2004). On the other hand, talent flow also helps promote international trade as the outflow talents have a preference for products from their home countries shall lower the trade costs (Head and Ries 1998).

Hypothesis and Conceptual Model

Previous studies show that the majority of international students plan to work in the host countries when considering what to do after finishing their school courses (Beine and Ragot, 2014). Job opportunities have been an essential factor that attracts international students studying in the host country. Higher GDP per capita rate usually implies a better economic situation for its constituents, and better job market prospects. These factors increase job opportunities and quality, which would make such economy and the potential job market more appealing to international students. This motivates my first hypothesis is that higher GDP per capita leads to more international students applying and looking to study in that country, holding everything else constant.

Not only is the level of GDP per capita an indicator of macroeconomic development in the recipient country, it also reflects its job market conditions. In addition, previous studies have concluded that the job opportunity is an important factor for international student mobility. Job market conditions, which are closely related to economic development, can also be a determining factor. When a country experiences economic downturn, the unemployment rate rises, and there is a substantial reduction in job opportunities, which means fiercer competition in finding and keeping a job. This leads many young workers and unemployed youth back to school in order to acquire or refresh their skills before returning to the job market. In this situation, there would be an increase in demand for tertiary education by local or domestic students. Since the number of students that can be enrolled in each school is limited, it is fair to expect that, on average, fewer international students would be admitted and enrolled. Therefore, the number of international students would decline. Therefore, my second hypothesis is that lower GDP per capita leads to

fewer international students applying and looking to study in that country, holding everything else constant.

This study of the relationship between economic activity and the level of international students enrolled in OECD countries uses a number of different model specifications that build on one another. The following general specification will be used to represent the level of international students:

$$\text{International Students}_{it} = f(\text{ECON}_{it}, X_{it}, e_{it})$$

where international students is measured as 1) the number of international students enrolled in tertiary education in country i during year t ; 2) the percentage of international students on tertiary level education of country i during year t . ECON represents the variables for economic activity, namely either *GDP per capita*, or *annual wage*. Since these two variables are highly correlated with each other, GDP per capita and wage will be used as the main independent variable but in separate models. X is a vector of time-varying covariates at the country level, including *government expenditure on tertiary level education, the average years of education, total number of population, trade, the exchange rate, and the inflation rate of each country*.

I control for the government expenditure on tertiary level education, as research shows that it affects the level of economic growth after some time-lag (Abhijeet, 2010). Meanwhile, higher investment in education spending by a host country increases the likelihood of attracting international students to study in that country. I also control for the average years of education, because a country with more average schooling years typically focuses more on education, indicating a higher quality in tertiary education; while international students are also more willing to go to those countries with better academic capacity.

Furthermore, I also include the total number of population into the control variables in that the Solow–Swan model assumes economic growth as a model including population growth, capital accumulation, labor, and technological progress. Thus, the size of a country’s population will certainly have an impact on economic growth. In addition, I control for the trade because a more open trade market indicates there will be more international trade; therefore, the market’s demand for international talents would keep increasing over time. International students will thus have more opportunities in the job market. In this sense, the openness of trade will be an attractive factor to the international students when they make decisions where to go. Moreover, the exchange rate is included in the control variables because Rodrik’s (2008) research has demonstrated that a high real exchange rate stimulates economic growth. Meanwhile, the exchange rate itself will certainly influence international students’ incentives to study in the host country as it changes their cost to study abroad. Last but not least, I control for the inflation rate as it represents a country’s economic stability by reflecting its purchasing power and economic well-being. This could also have the impact on students’ consideration on choosing the destination country.

My analysis uses three basic models to measure the direct effect of economic activity on international students in recipient countries: Ordinary Least Squares (OLS) models, OLS with year dummies, and OLS with country dummies. The basic OLS Model allows me to assess the relationship between the size of the population of international students and different levels of economic development. To control for unobserved time-variant factors that are constant across all countries, I added year dummies into the second specification. In a third specification, I add

country dummies in order to control for unobserved factors that are country-specific and that are time-constant.

Data Description

This paper uses a data gathered from World Development Indicators (WDI), OECD database, United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Quality of Government Institute (QoG) database. The data cover 28 OECD countries between 2002 and 2011. These datasets also contain economic and social development indicators that allow for a more complete set of covariates, including inflation rate, total population, and average years of education. Table 1 gives definitions for all variables and these data are publicly available through their websites. The key variables in my model are described in table 1.

Table 1: Key Variables and Descriptions

Variables	Description	Data Source
Dependent Variables		
intsize <i>(person)</i>	The total number of international students on the tertiary education level in the host country.	OECD Database
intpercent <i>(%)</i>	The proportion of international students on the tertiary education level in the host country.	Self-calculated using OECD database
Key Independent variables		
GDPpc <i>(thousands of current US\$ per capita)</i>	The gross value of all resident producers in the economy divided by population, including product taxes and excluding subsidies not included in the value of the products.	WDI
wage <i>(thousands of 2012 USD PPPs)</i>	The average annual wage per full-time equivalent employee in the host country. The data were measured in thousands of 2012 USD Purchasing Power Parity (PPPs).	OECD Database

Other Controls		
govntexp (% of GDP)	The annual government expenditure on education in the host country.	UNESCO
avesch (years)	The average schooling years for population aged 25 and over in the host country.	QoG
population (million)	The total population of the host country.	WDI
trade (% of GDP)	The sum of exports and imports of goods and services measured as a share of gross domestic product.	WDI
exchange (2005=100)	The real effective exchange rate. It is calculated by the nominal effective exchange rate divided by price deflator.	WDI
inflation (annual %)	The annual increase rate of GDP implicit deflator. It measures the rate of overall price changing in the economy, reflecting a country's economic stability.	WDI

The descriptive statistics for these key variables are listed in Table 2. In the dataset, there is a wide range of variation in dependent variables; especially for the number of international students.

Table 2: Key Variables Data Descriptive-28 OECD Countries (2002-2011)

Variables	Obs	Mean	Minimum	Maximum	Std.
<i>Dependent Variables</i>					
intsize	280	95,535	472	764,495	145,613
intpercent	277	8.17	0.15	28.91	6.83
<i>Key Independent Variables</i>					
GDPpc	280	34.24	3.58	99.17	16.98
wage	250	36.99	15.55	55.16	10.25
<i>Other Controls</i>					
governexp	280	1.32	0.32	2.69	0.45
avesch	280	10.25	4.37	13.29	1.78
population	280	24.68	0.14	311.58	55.24
trade	280	84.59	21.16	183.76	39.29
exchange	260	99.86	62.3	137.19	9.03
inflation	280	2.65	-5.39	37.42	3.39

Empirical Results

Table 3 shows the first set of results, where I estimate the relationship between the size of the international student population (the key dependent variable) and GDP per capita as the key independent variable. The results from Model 1 show that a \$1,000 increase in GDP per capita is associated with 1,302 more international students enrolling in tertiary education in the host country, holding other controls in the model constant. The coefficient on GDP per capita is statistically significant at the one percent level. The results confirm my hypothesis that GDP per capita is *positively* associated with the size of international student population. The reason could be that economic growth results in better education resources and quality as well as better job markets, which are the two most crucial attractions for international students.

Among the other controls, average years of schooling are also positively associated with the size of the international student population in the host country. As average years of schooling roughly reflects education quality in the country, the result is intuitively reasonable, because higher education quality is one of the major motivations for students to pursue a degree overseas. A higher average year of schooling not only implies better education quality; it also reflects an overall education capacity in certain countries. In order to increase or maintain average years of school at a high level, there must be enough educational resources, especially for populous countries.

Built upon Model 1, in Model 2 and Model 3 I add year fixed effects and country fixed effect respectively. See table 3. The correlation between the size of the international student population and GDP per capita remains statistically significant and positive in both models. However, the coefficient magnitude on GDP per capita becomes slightly smaller in Model 2.

Controlling year and country fixed effects helps avoid potential omitted variable bias that is associated with variations in different years and countries. This also suggests that the basic model suffers from omitted variable bias and a more precise estimate of the relationship between economic progress and international student size should be relatively smaller.

Table 3: Relationship between International Student Population Size and GDP per capita

VARIABLES	model 1	model 2	model 3
	OLS	OLS with Year Dummy	OLS with Country Dummy
<i>GDPpc</i>	1,302*** (379.3)	979.9** (388.5)	1,175*** (298.1)
<i>govntexp</i>	-52,301*** (16,293)	-49,943*** (15,975)	22,022 (16,749)
<i>avesch</i>	9,093*** (3,350)	7,979** (3,532)	4,580 (4,405)
<i>population</i>	1,695*** (87.16)	1,705*** (78.65)	7,826*** (1,415)
<i>trade</i>	-727.8*** (125.5)	-758.0*** (124.3)	60.34 (100.4)
<i>exchange</i>	-810.5 (773.7)	-1,091 (881.3)	-399.4 (287.8)
<i>inflation</i>	-72.10 (2,597)	760.0 (2,723)	-1,100 (715.0)
<i>Constant</i>	132,477 (95,734)	160,067 (102,761)	76,459 (49,266)
<i>Observations</i>	260	260	260
<i>R-squared</i>	0.686	0.695	0.976

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In the second set of results (Table 4), this paper uses the size of the international student population as the key dependent variable, and wage as the key independent variable. Holding other controls in the model constant, the results from Model 1 show that one thousand-dollar

increase in annual wage is associated with 4,846 more international students enrolled in tertiary education in the host country. The coefficient of wage is statistically significant at the 1-percent level. As in the previous model specification, Model 2 and Model 3 include year fixed effects and country fixed effect respectively. The correlation between the size of the international student population and wage remains positive and statistically significant at the one percent level in both models. However, the coefficient magnitude on wage becomes smaller, especially in Model 3. The reason may lie into the fact that some variables pertinent to specific countries may confound the main relationship. Thus, adding country fixed effects helps avoid potential omitted variable bias that is associated with variations in different countries.

Table 4: Relationship between the Size of the International Student Population and Wage

(Thousands of \$US)

VARIABLES	model 1	model 2	model 3
	OLS	OLS with Year Dummy	OLS with Country Dummy
<i>wage</i>	4,846*** (553.7)	4,607*** (520.9)	2,935** (1,189)
<i>govntexp</i>	-75,730*** (13,149)	-78,197*** (13,067)	21,380 (19,692)
<i>avesch</i>	14,060*** (3,006)	12,650*** (3,098)	10,274** (4,776)
<i>population</i>	1,339*** (93.69)	1,350*** (78.84)	8,089*** (1,454)
<i>trade</i>	-834.4*** (122.3)	-839.8*** (121.1)	224.6** (113.8)
<i>exchange</i>	-902.7 (858.3)	-1,703* (1,023)	-209.7 (327.5)
<i>inflation</i>	4,782* (2,537)	6,325** (2,846)	170.3 (758.3)
<i>Constant</i>	578.2 (92,473)	75,698 (105,801)	-112,817* (60,975)
<i>Observations</i>	240	240	240
<i>R-squared</i>	0.754	0.768	0.975

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The third and fourth sets of results (Table 5 and 6) follow the same sequence of three different specifications. However, the key dependent variable in these tables is the percentage of international students. The change of key independent variables allows me to explore whether the relationship is relevant only for the number of international students, or as a proportion of the entire student population in tertiary education. If the relationship between the percentage of international students and economic growth is also positive and significant, this means not only

that economic growth attracts foreign students, but that with economic growth, international students become a larger part of the student population in tertiary education.

The first set of results in Table 5 confirming that the results from Model 1, shows that one additional thousand dollars in GDP per capita is associated with a 0.149 percentage point increase in the international student proportion at the tertiary level in the host country, holding other controls in the model constant. The coefficient on GDP per capita is statistically significant at the 1-percent level. Using year fixed effects and country fixed effect, the correlation between the percentage of international students at the tertiary level and GDP per capita remains positive. The slightly smaller coefficients also suggest that the basic model suffers from omitted variable bias. Adding year and country fixed effects helps resolve bias that is associated with variation in year and countries.

Table 5: Relationship between International Student Percentage of Total Tertiary Students and GDP per capita

VARIABLES	model 1	model 2	model 3
	OLS	OLS with Year Dummy	OLS with Country Dummy
<i>GDPpc</i>	0.149*** (0.0338)	0.138*** (0.0392)	0.125*** (0.0177)
<i>govntexp</i>	-1.562 (1.086)	-1.477 (1.136)	1.396 (1.264)
<i>avesch</i>	0.957*** (0.361)	0.918** (0.365)	-0.0927 (0.466)
<i>population</i>	-0.0466*** (0.00738)	-0.0463*** (0.00754)	-0.0257 (0.0344)
<i>trade</i>	-0.0358*** (0.0124)	-0.0370*** (0.0127)	0.0298* (0.0177)
<i>exchange</i>	-0.0625 (0.0425)	-0.0715 (0.0489)	-0.00131 (0.0250)
<i>inflation</i>	-0.255 (0.217)	-0.236 (0.229)	-0.123 (0.0876)
<i>Constant</i>	6.546 (5.053)	7.600 (5.408)	15.85** (7.071)
<i>Observations</i>	257	257	257
<i>R-squared</i>	0.219	0.225	0.925

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In the fourth set of results (Table 6), the first specification shows that a one unit increase in wage (equal to a thousand dollars of the annual wage) is associated with an increase of 0.513 percentage points in the population of international student proportion at the tertiary level in the host country, holding other controls in the model constant. The coefficient on GDP per capita is statistically significant at the 1-percent level, even after adding year fixed effects and country fixed effect in Model 2 and Model 3. Coefficient magnitude continues to be much larger

compared with the coefficient on GDP per capita. Wage is again proved to be a strong incentive that attracts international students.

Table 6: Relationship between International Student Percentage of Total Tertiary Students and Wage (Thousands of \$US)

VARIABLES	model 1	model 2	model 3
	OLS	OLS with Year Dummy	OLS with Country Dummy
<i>wage</i>	0.513*** (0.0276)	0.506*** (0.0274)	0.583*** (0.0745)
<i>govntexp</i>	-3.943*** (0.604)	-4.052*** (0.611)	0.495 (1.161)
<i>avesch</i>	0.539*** (0.201)	0.483** (0.213)	0.0981 (0.435)
<i>population</i>	-0.0614*** (0.00419)	-0.0609*** (0.00436)	-0.0638* (0.0330)
<i>trade</i>	-0.0221*** (0.00743)	-0.0223*** (0.00746)	0.0304** (0.0146)
<i>exchange</i>	0.0453 (0.0339)	0.0226 (0.0352)	-0.00483 (0.0165)
<i>inflation</i>	0.161 (0.129)	0.220 (0.144)	-0.0479 (0.0440)
<i>Constant</i>	-12.47*** (3.894)	-9.946** (4.106)	-6.974 (5.904)
<i>Observations</i>	237	237	237
<i>R-squared</i>	0.612	0.624	0.946

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Policy Implication and Conclusion

This paper demonstrates that economic activity, in the form of GDP per capita or real wages, is positively related to the size of the international student population, both in absolute and in relative terms, which confirms my first hypothesis that higher GDP per capita in a developed country is associated with more international students applying and looking to study in that, holding everything else constant. Conversely, lower GDP per capita is associated with fewer international students applying and looking to study in that country, holding everything else constant. The reason could be that economic growth results in better educational resources and quality as well as better job markets, which are two of the most crucial reasons attracting international students.

Although my models include many control variables, they still suffer from omitted variable bias. The exclusion of such factors may bias the key coefficients in my regression results. For example, the lower the student-teacher ratio, the more incentive international students have to study in the host country as a low ratio is a favorable sign of a high quality of education (Wei, 2013). Meanwhile, the student-teacher ratio may also be negatively correlated with a host country's economic status, as well-developed countries may have higher demand for teachers. Therefore, the omission of the student-teacher ratio may exert an upward bias the key coefficient of the regression results (i.e., GDP per capita).

Based on my results, further research could take several potential directions. Future studies could explore the relationship between the international student population and economic status from the perspective of the country of origin. In addition, new studies might employ metrics other than GDP per capita and wage to measure economic growth, for example, the

unemployment rate. Moreover, by controlling for more omitted variables, the model could provide a more accurate estimation.

Nowadays, as migration flows increase, some developed countries have established restrictive immigration policies to control the inflow migrants to protect local benefits. However, these policies also restrict the inflow of international talent, which contributes to the development of science and technology. International students are valuable not only because they contribute significantly to the education environment in developed countries, but also because international students bring new and innovative ideas. Therefore, policy makers should modify their immigration policies for international students based on the current economic situation.

During economic boom times, both GDP per capita and annual wages will increase. As shown in my findings, the country's demand from international students will also increase accordingly. In that case, policy makers should relax immigration policy by simplifying the visa process so as to attract more international students. At the same time, policy makers should also encourage universities to have more exchange programs and make the admission process easier. By having education policy more favorable to international students, the host country is more likely to have larger numbers of talented international students.

On the other side, when the host country is experiencing a recession, GDP per capita and annual wages will decrease. Based on my findings, the country's demand from international students will also decrease. Since economic downturn is very likely to cut government funds for higher education and education institutions would face adverse domestic demographic trends in terms of the number of potential students, universities are more willing to accept international

students in order to close the funding gap. Thus, immigration and education policies should adapt in advance to those changes to make sure that they fill their budget needs while getting the best and brightest of the pool of international applicants.

Appendix

Table: GDP per capita and number of the international students

Country	GDP per capita (measured in constant US dollars)		Number of international students (tertiary education)	
	2002	2011	2002	2011
<i>Australia</i>	20,071	62,081	179,619	301,643
<i>Austria</i>	25,679	49,485	28,452	70,558
<i>Belgium</i>	24,465	46,464	40,354	51,572
<i>Canada</i>	23,425	50,578	150,552	203,823
<i>Czech Republic</i>	7,691	20,580	9,753	38,041
<i>Denmark</i>	32,344	59,898	14,480	29,708
<i>Finland</i>	25,994	48,678	6,760	15,707
<i>France</i>	23,494	42,560	165,437	268,212
<i>Germany</i>	24,326	44,355	219,039	272,797
<i>Greece</i>	13,292	26,061	80,228	32,828
<i>Hungary</i>	6,535	13,783	11,783	18,850
<i>Iceland</i>	30,979	44,030	472	1,239
<i>Ireland</i>	31,286	49,387	9,206	32,123
<i>Italy</i>	21,435	36,180	28,447	73,461
<i>Japan</i>	31,235	46,134	74,892	151,461
<i>Korea</i>	12,093	22,388	4,956	62,675
<i>Netherlands</i>	27,110	49,886	18,888	57,379
<i>New Zealand</i>	16,715	36,919	17,709	72,796
<i>Norway</i>	42,291	99,173	7,679	16,628
<i>Poland</i>	5,184	13,382	7,401	22,925
<i>Portugal</i>	12,696	22,533	14,811	21,824
<i>Slovak Republic</i>	6,442	17,760	1,643	9,131
<i>Spain</i>	16,565	31,118	44,860	107,405
<i>Sweden</i>	28,119	56,755	22,859	50,078
<i>Switzerland</i>	39,350	83,087	29,301	58,943
<i>Turkey</i>	3,576	10,605	16,328	31,118
<i>United Kingdom</i>	27,305	39,186	227,273	559,948
<i>United States</i>	38,175	49,854	582,992	764,495

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