The determinants of international student mobility
- An empirical study on U.S. Data
ABSTRACT

The increase in foreign students in countries such as the US, the UK and France suggests that the international ‘education industry’ is growing in importance. The purpose of this paper is to investigate the empirical determinants of international student mobility. A secondary purpose is to give tentative policy suggestions to host country, source country and also to provide some recommendations to students who want to study abroad. Using pooled cross-sectional time series data for the US over the time period 1993-2006, we estimate an econometric model of enrolment rates of foreign students in the US. Our results suggest that tuition fees, US federal support of education, and the size of the ‘young’ generation of source countries have a significant influence on international student mobility. We also consider other factors that may be relevant in this context.

Key words: international student mobility cross-section time series model Source country host country
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1. INTRODUCTION

In recent years, more and more students choose to study abroad to obtain higher education. Throsby (1999, p.11) conclude that because of improved international communications, decreasing real cost of air travel, a widening range of educational opportunities for foreign students, increased globalization of labor markets and other factors, more students choose to study abroad. Internationally mobile students was defined by Kelo et al. (2006, p.210) as “…students who have crossed a national border to study or to undertake other study related activities, for at least a certain unit of a study program or a certain period of time, in the country to which they have moved”. The present paper is mainly focused on international student mobility.

“France, Germany, the United Kingdom and the United States receive more than half of all foreign students worldwide. In absolute numbers, international students from France, Germany, Japan and Korea represent the largest numbers from OECD countries. Students from China and India comprise the largest numbers of international students from partner economies”. (OECD 2007, p.6)

However, in spite of the growing importance of the international ‘education industry’, little research on international student mobility has been undertaken. The primary purpose of this paper is to provide an empirical investigation of determinants that could influence international student mobility. A secondary purpose is to give tentative recommendations for policy of host countries, source countries and also students who want to study abroad.

A way to approximately measure international student mobility is to use the numbers of foreign students enrolled in higher education in the host country. Hence, factors that influence enrollment numbers can be seen to represent factors that influence international student mobility. Since it is difficult to find relevant data of many host and source countries, we have chosen to only focus on the US as a host country.\(^1\)

Choosing U.S. is also because the United States remains by far the most popular

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\(^1\) Host country is destination country which international students want to study.
destination for international students. According to the Assistant Secretary of State for Educational and Cultural Affairs, Goli Ameri, “In today’s competitive international environment, the increase in enrollments noted in this year’s Open Doors data demonstrates again that the U.S. remains the premier destination for international students. U.S. higher education is unparalleled in its vitality, quality, and diversity. The U.S. government joins the U.S. higher education community in a commitment to welcome international students to the United States. As someone who graduated from an American university as an international student, I have experienced America’s welcome personally and can testify that America’s universities not only accept and welcome international students warmly, but transform their lives.” (Open Doors report\(^2\) 2008, p.1)

The source countries\(^3\) we choose are based on the largest share of proportional enrollment number of each continent area so as to analysis the world international student mobility. The list of countries is: China, India, Brazil, Turkey, Germany and Canada. “Since Asian students comprise some 63% of the foreign student intake to higher education of U.S. in 2005, with 16% of international students coming from China and 14% coming from India according to the OECD (2007, p.6)”. Since the Indian share is so large we have chosen both China and India to represent Asia.

The model we chose is a pooled cross-section time series econometric model, the time frame of the study is 1993-2006. The model includes the following explanatory variables: tuition fees, relative living expense, U.S. federal support for education, exchange rates between host and source country, global involvement of the source country, the size of the young generation of the source countries and the geographical distance between each source country and host country.

The paper is organized as follows. Section 2 gives a background of international student mobility. Section 3 presents a brief literature review. In section 4 we outline

\(^2\) The Open Doors report is published by the Institute of International Education, the leading not-for-profit educational and cultural exchange organization in the United States. For more information the homepage is available: [http://opendoors.iienetwork.org](http://opendoors.iienetwork.org)

\(^3\) Source country is home country where international students come from.
the empirical model and present the data and section 5 contains the results of the econometric analysis. Conclusions are presented in the last section.
2. BACKGROUND

2.1 Current situation

Nowadays, several million students all over the world study outside their own countries every year. In the past 20 years, education has become an industry with tremendous potential as other trade business. Nowadays, it represents not only by import and export of textbooks of international examinations such as TOEFL, GRE, but also by many other areas (Liston and Reeves 1985 cited Naidoo 2007). According to statistics, 2.9 million students from all over the world who were accepted by the tertiary education studied abroad in 2006 (OECD, 2008). It is predicted that more than 7 million students will be accepted in 2025 (Böhm et al. 2002; Perraton, 2004). Obviously the increasing trend of studying abroad is unavoidable. In short, it is a great potential market, especially for the tertiary education in many developed countries. We can illustrate trends in the absolute numbers of foreign students by figure 1 as follow.

Figure 1 Long term growth in the number of students enrolled outside their country of citizenship (in Million)

--Growth in internationalization of tertiary education (1975-2006)

From Figure 1, we see that the foreign enrollments grew dramatically between 1975 and 2006. The number of students who are enrolled outside their own countries has increased from 0.6 million in 1975 to 2.9 million in 2006. “Growth in the internationalization of tertiary education has accelerated during the past eleven years, which reflects the growing globalization of economies and societies” (OECD 2008, p.352). As a result, globalization in education leads to the growth of academic mobility (McMahon 1988 cited by Naidoo 2007).

As Education at a Glance 2008 (OECD, 2008) shows, Asian students become the largest group of international students who are enrolled in countries. The OECD and the UNESCO Institute for Statistics (2008) reported: 45.3 % of the total in all reporting destinations. And their favorite destinations are Australia, Japan, Korea and New Zealand, where more than 73% of international or foreign students originate from Asia. This is also seen below in figure 2.

**Figure 2 Distribution of international and foreign students from Asia in tertiary education, by country of origin (2006)**


It is easy to find that in these hotspot countries, Asian students accounted for a substantial proportion. “Among all international students, students from China represent the largest group, with 15.4% of all international students enrolled in the
OECD area (not including an additional 1.3% from Hong Kong, China). Their destination of choice is the United States, followed closely by Japan, with 20.7% and 19.1%, respectively, of all international Chinese students studying abroad. Students from China are followed by those from India (5.4%), Morocco (1.6%), and Malaysia (1.6%) and the Russian Federation (1.2%)” (OECD 2008, p.359). Due to the rapid economic development, people from many emerging countries have more economic support to afford them to study abroad. What’s more, the great demand of internationalized qualified people who have a deep understanding of the world’s languages, cultures and business methods are increasing (OECD, 2008).

There are many factors that may affect the choice of country in which to study. First of all, the language spoken or used is critical when choosing a country to study. The countries that use widely spoken and official languages (such as English and French) are very popular. Secondly, the net expense also restricts the international students’ choice. It consists of many factors, like tuition fee, living costs and so on. If education quality is similar, the lower cost will attract more enrollments undoubtedly. In our opinion, another important thing is current employment rate in source and host countries. The tendency of students is towards higher employment rate usually. Finally open immigration policy is another key factor. Countries with policies encouraging temporary or permanent immigration make such countries more attractive to international students. It is also favorable to make use of their knowledge to enhance economy of destination countries. To foreign students, Australia, Canada and New Zealand are, for example, easy to stay in and to find a job after graduation. Comparing with most European countries, studying abroad in such countries may have a more substantial impact on the students’ future lives beside the knowledge acquired.

In 2006, the United States received the most with 20% of all foreign students from other countries, followed by the United Kingdom (11%), Germany (9%) and France
(8%) (OECD, 2008). The share of international students of different countries can be illustrated by following pie chart.

**Figure 3 Distribution of foreign students in tertiary education, by country of destination (2006)**

![Distribution of foreign students](image)


**Table 1 Expenditure on educational institutions as a percentage of GDP, by level of education (1995, 2000, 2005)**

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2000</th>
<th>1995</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tertiary education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>2.9</td>
<td>7.1</td>
<td>2.7</td>
</tr>
<tr>
<td>OECD mean for 24 countries</td>
<td>1.4</td>
<td>5.6</td>
<td>1.3</td>
</tr>
</tbody>
</table>


Through the calculation, France, Germany, the United Kingdom and the United States absorb nearly half of all foreign students worldwide (OECD, 2008). Among them, U.S. is very prominent. Because of powerful economic strength and excellent
education resources, most of international students choose the United States as their first aim. To absorb more international students and enhance itself quality, the United States government increases the input of education continuously, see Table 1. Compared with the average level of OECD countries, the investment of education of US is much higher. The government wills to pay larger percentage of GDP to keep its high quality of education. Better research environment has become a key advantage to attract worldwide students and professors. Because of the views above, we can find it easily that United States is the best observation.

2.2 The impact of studying abroad

“International mobility of students not only contributes to the internationalization of education institutions but also impacts on the outlooks and subsequent careers and lifestyles of the students themselves” (Li & Bray 2007, p.793). OECD (2008) reported that international students make up 15% or even more of enrollment in tertiary education in Australia and New Zealand. They also make up more than 20% of enrolments in advanced research program in Belgium, Canada, New Zealand, Switzerland, the United Kingdom and the United States. All of these countries and individuals are likely to involve themselves into international education, because it has many positive impacts on them.

To individuals and source country

The governments of source countries as well as individuals are looking to higher education to develop their understanding of the world’s languages, cultures and business methods (OECD, 2008). Studying abroad is the best and direct way for students to expand their knowledge of other foreign societies and languages in other countries rather than their motherland. It is also a good opportunity for students to receive higher level education. In addition, studying opportunities abroad could help
the countries which have limited resources on education to ease the pressure of bottlenecks in enrollment. It makes more students have chance to access into campus.

**To host country**

“In the long-term, internationalization of education is likely to have an increasing impact on countries’ balance of payments as a result of revenue from tuition fees and domestic consumption by international students. In the short run, monetary costs and benefits are reflected in the current account balance” (OECD 2008, p.350).

The rapid expansion of tertiary education brings financial pressures on education systems. As a result of this, more countries have greater interest in recruiting foreign students. And more tertiary institutions and government increasingly rely on revenues which generate from tuition fees charged by foreign students.

To absorb more students, tertiary education institutions also provide some scholarships and financial support to international students in order to have some incentives. That can promote the reforming of institution level.

In short, because of all reasons above, internationalization of education has become a big part of international trade and is worth to discuss more and deeper about it.
3. LITERATURE OVERVIEW

In this paper, we would like to study the determinants of student mobility. It is easy to find that there are many economic, social and other factors that affect the enrollment of international students in a university, for instance, education quality, living level of destination country, possibilities to find a job after graduation, etc. However, as an emerging field of scientific research, little research has paid closer attention to the factors that influence international student mobility.

For example, one of the important studies on foreign study was written by Lulat and Cordaro (1984 cited by Naidoo 2007). But we found very few studies that have discussed the determinants of international student mobility. There is much research on the issue of studying abroad from educational and cultural perspectives. But research on the determinants of studying abroad still seems to be lacking. This may have a negative effect on setting up policy directions and recruitment strategies.

However, one important analysis helps to show how supply and demand relationships are formed is the push-pull model (Li & Bray, 2007). This model has become a basic theory in this field. Many other theories rely on it. “Altbach (1998 cited by Li & Bray 2007, p.793) presented what is the push–pull model for international student mobility. Through this model, he pointed out the reasons of studying abroad that some students were pushed by unfavorable conditions in their home countries, while others were pulled by scholarships and other opportunities in countries of destination” .Some host countries don’t welcome foreign students, particularly when those students get benefit from the host governments. However others have welcomed foreign students dramatically. Many countries have realized that absorbing foreign students is both an economic investment and a way of expanding the horizons of domestic students. As Davis argued (1995 cited by Li & Bray 2007), the pull factors of the host countries included many factors, such as research institutions; social, economic and political environments and international classmates. However, the push factors can be
concluded as interest in overseas education. Though the push–pull model provides a basic classification, it still has some limitations. Thus, we need additional research. Another study about the dynamics of student mobility indicated that in a sample of 241 individuals, 51.5% of them planned to continue their studies abroad, 38.5% had no plan to do so, and 10.0% were unsure (Zheng, 2003). Zheng (2003, p.226) also found that the factors which have effect on students’ intentions to study abroad could be accounted as followed: economic factors (29%), educational factors (27%), student’s personal factors (15%), social factors (13%), cultural factors (9%), and political factors (7%). Most of these factors were external forces which had the influence on students’ choices; however personal factors affected the students’ choices at the same time. As well as we has mentioned above, Zheng (2003) found that economic, educational and personal factors were the most important determinants of students’ intentions to study abroad. This opinion has been accepted at large, but there are still some different voices existing.

Since there is no definitive consensus on the correct set of determinants, we choose some variables which we believe to be critical to students’ mobility. By using econometric methods, our aim is to examine the factors that may have statistically and economically significant effects on student mobility.
4. THE EMPIRICAL MODEL AND DATA DESCRIPTION

4.1 Hypotheses

The motivations to study overseas are complex. There may be many different reasons that explain the phenomenon of studying overseas. In order to find the determinants behind international student mobility, a framework categorizing these various rationales into economic and non-economic factors can be highlighted (Naidoo, 2007). Naidoo (2007) provides the diagram in Figure 4 to categorize the various determinants of the demand for international education.

Figure 4 An integrative conceptualization of the literature on demand for international education

Source: Naidoo (2007), Research on the flow of international students to UK universities: Determinants and implications
To capture the effect of social/cultural reasons we use the size of the young generation population, level of global involvement of source country and distance to represent the geographic/cultural proximity of host country. Variables that aim at capturing economic reasons we choose the tuition fee in host country, purchasing power parity between host country and source country. As political reasons, we choose the following variable, host country’s federal support for high education as one determine factor. In the following part the theoretical underpinning behind the influence of these six factors is highlighted.

**Tuition fees in host country (TUI)**

Tuition fees are an important thing to consider when a student plans to study abroad. According to demand theory (Besanko & Braeutigam, 2005) we specialize on “student demand”, there is an inverse relationship between domestic tuition fees and domestic higher education enrolment.

\[
\text{Demand elasticity} = \frac{\text{the change in quantity demanded}}{\text{the change in price}} \times 100\%
\]

If customers are sensitive to price, a price reduction will increase the demand for the item and total revenue received. We can also say that demand is elastic and the quantity demanded changes more than the change in price. If customers are insensitive to price, that is, demand is inelastic, a price reduction will result in a small relative change in quantity demanded and total revenue will fall slightly. And the quantity demanded changes less than the change in price.

Campbell and Siegel (1967 cited by Naidoo 2007) present research on educational demand; they found a negative price elasticity of enrolment in domestic higher education demand. Similarly Leslie and Brinkman (1987 cited by Naidoo 2007) reported the demand elasticity of enrolment with respect to tuition fees to be negative. Although this research has largely focused on domestic education, it seems reasonable to assume that the results are also relevant for the demand of international education;
that is, there should also be a negative relationship between tuition fees and international education enrolment.

**Host country expenditure on higher education (U.S. support)**

Government expenditure on education, especially on higher education may influence the school quality and quantity. A high level of quality of education, comfortable learning environment, open study atmosphere, well appointed education facilities and adequate funding for research, all these factors may attract international students from all over the world. Government expenditures could help to fulfill these dimensions of education and improve them.

So there should be positive relationship between host country support of higher education and international student enrolment.

**Global involvement of the source country (Invol)**

Nowadays globalization is a main tendency of the whole world economic development and business in a global system becomes more and more integrated. The more involved a country is in the global economy, the more human capital resources of who can capable to handling the challenges in a global system. So source countries are more likely to encourage student to study abroad. And students themselves also want to be more competitive in the global economy, overseas study become a must for its future workforce. The source country's involvement in economic globalization, which we measure as foreign direct investments (FDI) in the country, because higher foreign direct investment shows this country has more connection with outside world, its involvement level is higher.

There should be positive relationship between globalization involvement and international student enrolment.
Young generation population of source country (YG)

International student enrolment is also affected by the size of the young generation population of the source country. Larger populations of young generation, larger people need to be educated and larger number of student chooses to study abroad. There should be a positive relationship between the size of the young generation population in the source country and international student enrolment.

Distance between host country and source country (Distance)

Distance is a factor that may relate to both economic factors and cultural proximity of source and host countries. Normally, the longer the distance, all else equal, the lower the enrolment rate. Because longer distance may cause higher costs and also relate to cultural differences. For foreign student, more similar cultures make it easier to be involved in the host country. On the other hand, large cultural differences may attract some students to come and study and experience a different culture.

Purchasing Power Parity (PPP)

Purchasing power parity (PPP) is one of the foundations of international economics which is developed by Gustav Cassel (1921). “PPP states that price levels in any two countries should be identical after converting prices into a common currency” (Pakko and Pollard 2003, p.9). It means the purchasing power exchange rate between two countries is equal to the ratio of two countries' price level of a certain basket of goods and services. PPP consider the living cost and the inflation problem of different countries, so this variable is better than only living expense, exchange rate or nominal GDP. Furthermore, PPP could determine the trend of exchange rate in the long run. If the purchasing power of source country is stronger, the value of this country’s currency will increase, but the value of purchasing power exchange rate will decrease. We could use less money of source country to exchange fixed amount money of host
country. The enrollment will also increase. Thus the relationship between PPP and international student enrolment should be negative.

4.2 Model

The model of the determinants of international student is given by Naidoo (2007):

$$ENROL_{ij} = f(ACCESS_i, TUI_j, EXCHA_{ij}, INCOME_i, INVOL_j)$$

We extend this model by adding more variables and take logarithm of dependent variable and independent variables so that make this model becomes log-log model. The reason of choosing log-log model is that this kind model provides a much better representation of the data than the commonly used model. The parameters of the log-log model also have an interpretation as elasticity. By comparing the output of ordinary model and the log-log model, the latter fit data better and provides more convincing output.

A pooled regression model across the source countries and the 1993-2006 time periods was used to capture the variations that emerge across N spatial units and T time periods. Dummy variables for each source country were also added to the model.

$$\log (Enrol_{ijt}) = \alpha_0 + \alpha_1 \log(TUI_{it}) + \alpha_2 \log(U.S.\ Support_{it}) + \alpha_3 \log(Invol_{jt})$$
$$+ \alpha_4 \log(YG_{it}) + \alpha_5 \log(Distance_{ijt}) + \alpha_6 \log(PPP_{ijt}) + \alpha_7 D_{China}$$
$$+ \alpha_8 D_{India} + \alpha_9 D_{Brazil} + \alpha_{10} D_{Turkey} + \alpha_{11} D_{Germany} + \epsilon_{ijt}$$

Where:

$i=1$ (U.S.)

$j=1, 2, 3, 4, 5, 6$

$t=1993, 1994, \ldots, 2006$

$Enrol_{ijt}$: The number of students from country j enrolled in country i in year t

$TUI_{it}$: The tuition fee of host country i which international student have to pay in year t

$U.S.\ Support_{it}$: Host country i government final consumption expenditure on postsecondary education in year t
Invol_{jt}: The extent of involvement that source country j has in the global economy in time t

Distance_{ijt}: The distance from source country j to host country i

PPP_{ijt}: The purchasing power parity between host country i and source country j in time t

YG_{jt}: Young population of source country j in year t

D_{China}: Takes the value of 1 when country j= China and 0 otherwise

D_{India}: Takes the value of 1 when country j= India and 0 otherwise

D_{Brazil}: Takes the value of 1 when country j= Brazil and 0 otherwise

D_{Turkey}: Takes the value of 1 when country j= Turkey and 0 otherwise

D_{Germany}: Takes the value of 1 when country j= Germany and 0 otherwise

Canada is used as a baseline for the model.

ε_{ijt}: Error term

4.3 Data description

Enrol

We applied the number of foreign students enrolled in institutions of higher education in the United States each year from 1993-2006 in different source countries; this measure represents the stock of students at a particular point in time not the annual flow of enrolment. Because we cannot get the exact number of foreign student graduated each year, the flow of international students is hard to measure.


TUI

There are two main type educational institutions in the United States: private and public. Large tuition gaps in tuition fees exist between the two. If we would apply one
of them we may not estimate tuition fees sufficiently well. To solve this problem, enrollment number of private/public can be observed, so the proportion of private institute and public institute can be calculated. By using these proportions we finally get the weighted average tuition fee. The equation is:

\[
\text{Average tuition} = \frac{\text{enrol of private} \times \text{private tuition} + \text{enrol of public} \times \text{public tuition}}{\text{enrol of private} + \text{enrol of public}}
\]

The data for this dependent variable is from U.S. National Center for Education Statistics, Digest of Education Statistics, annual and U.S. Census Bureau, Current Population.

**U.S. support**

This factor is to reflect the federal support of education. We collect the government final consumption expenditure on education for each year from 1993 to 2006. Though this expenditure is for whole education system, the more education support also represents the more support for higher education.

The data for this variable is from The Key Global Indicators database (the UN Common Database).

**Invol**

Just mentioned on hypothesis part above, global involvement of source country is hard to measure, so we decide to use FDI of each source country to be indicator which represents the level of global involvement of source country.

The data for this variable is from The Key Global Indicators database (the UN Common Database).

**YG**

Population of young generation is specialized the age between 15 and 29, because most of individuals choose to take higher education during this period.
The data for this variable is from The Key Global Indicators database (the UN Common Database).

**Distance**

In order to measure the distance between host country and source country, we use the distance between each one of the six capitals and the capital of United States-Washington DC as proxy.

The data for this variable we calculate is from one website tool which USL: [http://www.convertunits.com/distance/](http://www.convertunits.com/distance/).

**PPP**

This variable is the value of PPP between source country and United States. Here, US dollar seems as the standard currency. We collect the data from 1993 to 2006.

The data for this variable is from The Key Global Indicators database (the UN Common Database).

Table 2 shows the general information of observations. We could see the central tendency and dispersion of the data.

**Table 2: data description**

<table>
<thead>
<tr>
<th>Variable Statistics</th>
<th>logenrol</th>
<th>logtui</th>
<th>logU.S.support</th>
<th>loginvol</th>
<th>logYG</th>
<th>logdistance</th>
<th>logppp</th>
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<tr>
<td>Obs</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mean</td>
<td>9.831108</td>
<td>8.553659</td>
<td>12.972340</td>
<td>7.517108</td>
<td>10.256620</td>
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<td>Std.Dev.</td>
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<td>1.504686</td>
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<td>Min</td>
<td>8.512583</td>
<td>8.177364</td>
<td>12.627000</td>
<td>-1.047992</td>
<td>8.354674</td>
<td>6.120297</td>
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<td>12.969210</td>
<td>7.709650</td>
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5. EMPIRICAL EVIDENCE

5.1 Econometric results

The econometric model is first estimated by Ordinary Least Square estimation and result is outlined in Table 3

<table>
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<th>logenrol</th>
<th>Coef.</th>
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<td>D India</td>
<td>0.419623</td>
<td>0.207711</td>
<td>2.02</td>
<td>0.047</td>
</tr>
<tr>
<td>D Brazil</td>
<td>-0.85657</td>
<td>0.36124</td>
<td>-2.37</td>
<td>0.02</td>
</tr>
<tr>
<td>D Turkey</td>
<td>0.085868</td>
<td>0.885519</td>
<td>0.1</td>
<td>0.923</td>
</tr>
<tr>
<td>D Germany</td>
<td>0.292889</td>
<td>0.712469</td>
<td>0.41</td>
<td>0.682</td>
</tr>
<tr>
<td>_cons</td>
<td>-7.66305</td>
<td>2.652458</td>
<td>-2.89</td>
<td>0.005</td>
</tr>
</tbody>
</table>

N: 84
R square: 0.9758
Adjusted R square: 0.9725
F value: 294.61
DW: 0.3486983

In principle, the model can be estimated on the pooled cross section time series data by using ordinary least squares (OLS). However, pooling data usually results in violation of many standard assumptions for obtaining a best linear unbiased estimator (BLUE). For instance, the behavior of the disturbances over the cross sectional units (states, countries, etc.) at some specific time is likely to be different from the behavior of the disturbances of a given cross-sectional unit over time (Minghao & Jurgen, 1998). In other words, the nature of this type of data might cause time-wise autocorrelation within the region and heteroskedasticity across regions (Kmenta cited
by Minghao & Jurgen, 1998). After testing our model, we found DW value is small, so there is autocorrelation in the model. To tackle this problem we add a linear time trend variable to the model.

By observing the estimation result, we found the dummy variable of China is dropped. How does this happen? One variable exist can explain this. Distance for each source country during the time trend is constant. It has the same constant effect with dummy variable in our model. So when do the estimation, we should separate distance and dummy variables. The model is changed by following:

\[
\log(\text{Enrol}_{ijt}) = \alpha_0 + \alpha_1 \log(\text{TUI}_{it}) + \alpha_2 \log(\text{U.S. Support}_{it}) + \alpha_3 \log(\text{Invol}_{it}) \\
+ \alpha_4 \log(\text{YG}_{jt}) + \alpha_5 \log(\text{PPP}_{ijt}) + \alpha_7 D_{China} + \alpha_8 D_{India} + \alpha_9 D_{Brazil} \\
+ \alpha_{10} D_{Turkey} + \alpha_{11} D_{Germany} + 8t + \varepsilon_{ijt}
\]

\(t=1\) if the year is 1993

\(t=2\) if the year is 1994

\(t=14\) if the year is 2006

\(t=1\sim14\)

It is possible to transform the model so that the Gauss-Markov assumptions can be satisfied. For linear regression model: \(y = X\beta + \varepsilon\), the Gauss-Markov assumptions are (Verbeek, 2008):

(a) the expected value of the error term is zero

\[E[\varepsilon_i] = 0, \ i = 1, \ldots, N\]

(b) \(X\) and \(\varepsilon\) are independent

\(\{\varepsilon_1, \ldots, \varepsilon_N\}\) and \(\{X_1, \ldots, X_N\}\) are dependent

(c) the error terms have the same variance (the assumption of homoskedasticity)

\[Var[\varepsilon_i] = \sigma^2 > 0, \ i = 1, \ldots N\]

(d) zero correlation between different error terms, excluding any form of autocorrelation

\[Cov[\varepsilon_i, \varepsilon_j] = 0, i, j = 1, \ldots N\ \text{and} \ i \neq j\]

So we also use GLS to estimate the new model which is alternative estimator of OLS.
<table>
<thead>
<tr>
<th>Variable</th>
<th>OLS⁴</th>
<th>OLS⁵</th>
<th>OLS⁶</th>
<th>GLS⁷</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parameters (Std.Err.)</td>
<td>Parameters (Std.Err.)</td>
<td>Parameters (Std.Err.)</td>
<td>Parameters (Std.Err.)</td>
</tr>
<tr>
<td>logenrol</td>
<td>-1.64869 (0.519741)***</td>
<td>-2.78787 (2.357443)***</td>
<td>-2.67603 (0.790143)***</td>
<td>-1.25045 (0.424697)***</td>
</tr>
<tr>
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<td>2.36365 (0.53701)***</td>
<td>0.445547 (5.952373)***</td>
<td>-0.98232 (1.976953)***</td>
<td>1.378552 (0.872601)***</td>
</tr>
<tr>
<td>logussupport</td>
<td>0.005439 (0.008642)**</td>
<td>0.049446 (0.021184)**</td>
<td>0.004272 (0.008558)**</td>
<td>0.009008 (0.002906)***</td>
</tr>
<tr>
<td>loginvol</td>
<td>0.736522 (0.273117)***</td>
<td>0.801266 (0.054454)***</td>
<td>0.81195 (0.273177)***</td>
<td>0.796137 (0.296139)***</td>
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<tr>
<td>logYG</td>
<td>-0.8224 (0.409943)**</td>
<td>-0.82307 (0.080991)***</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>logdistance</td>
<td>0.03721 (0.022773)**</td>
<td>0.070948 (0.01431)***</td>
<td>0.030944 (0.01431)***</td>
<td>0.018489 (0.018672)***</td>
</tr>
<tr>
<td>logPPP</td>
<td>0.419623 (0.207711)**</td>
<td>---</td>
<td>0.952594 (1.117148)**</td>
<td>0.22987 (1.258778)*</td>
</tr>
<tr>
<td>D China</td>
<td>-0.85657 (0.36124)**</td>
<td>---</td>
<td>-2.84384 (0.557484)***</td>
<td>-3.2421 (0.602531)***</td>
</tr>
<tr>
<td>D India</td>
<td>0.085868 (0.885519)**</td>
<td>---</td>
<td>-1.94618 (0.315906)***</td>
<td>-2.2067 (0.290532)***</td>
</tr>
<tr>
<td>D Brazil</td>
<td>0.292889 (0.712469)**</td>
<td>---</td>
<td>-1.58658 (0.204934)***</td>
<td>-1.8819 (0.216273)***</td>
</tr>
<tr>
<td>D Turkey</td>
<td>0.34966 (0.413185)**</td>
<td>0.236468 (0.138321)*</td>
<td>0.0319 (0.060275)***</td>
<td>0.9791 (12.83346)***</td>
</tr>
<tr>
<td>t</td>
<td>294.61 (2.652458)***</td>
<td>36.69 (86.83365)***</td>
<td>275.14 (28.69628)***</td>
<td>306.96 (12.83346)***</td>
</tr>
<tr>
<td>_cons</td>
<td>-7.66305 (2.652458)***</td>
<td>24.68656 (86.83365)***</td>
<td>35.93378 (28.69628)***</td>
<td>-3.99085 (12.83346)***</td>
</tr>
<tr>
<td>N</td>
<td>84</td>
<td>84</td>
<td>84</td>
<td>84</td>
</tr>
<tr>
<td>R square</td>
<td>0.9758</td>
<td>0.7171</td>
<td>0.9768</td>
<td>0.9791</td>
</tr>
<tr>
<td>Adjusted R square</td>
<td>0.9725</td>
<td>0.7506</td>
<td>0.9732</td>
<td>0.9759</td>
</tr>
</tbody>
</table>

⁴ Using OLS to estimate the original model which contain all the variables we hypothesis without time trend variables.
⁵ Using OLS to estimate the model which without dummy variables.
⁶ Using OLS to estimate the model which is not contain the variable of distance.
⁷ Using GLS to estimate the model which without the variable of distance.

Note: *, ** and *** means significantly different from zero at the 10%, 5% and 1% level of significance, respectively.
5.2 Discussion of the results

TUI

Observing four results from OLS, OLS with time trend and GLS, the coefficient of logtui is negative as expected. Thus, it indicates a negative price elasticity of ‘student demand’. The influence of tuition fees on international student enrolment was found to be significant for 3 different estimations. Tuition fees are one of the most important factors which influence the international student mobility. This implies that the higher level of tuition fees charged to the international students, the lower their respective demands for international education will be. But in reality, the most popular host country such as United States and United Kingdom, the tuition fees usually charged are higher than in other host countries. Even though there are high tuition fees, students still choose these destination countries to accomplish study. Why does this happen? An important variable is omitted—school quality. United States and United Kingdom have a large number of high quality universities. This is a main factor that attracts students from all over the world. Students would like to choose high quality school if he can afford the high tuition fees. If two schools have same level of quality, the higher tuition fee charged, the fewer students will be enrolled. So our result is still reasonable.

But school quality is hard to measure; we cannot apply this variable in our econometric model. And this important omitted variable may be one reason that causes autocorrelation.

US support

In 3 results the coefficient of government financial support is positive. But in OLS with time trend variable the result is negative. In first OLS result, its t-value is highly significant. This support can be embodied from two factors mainly. On one hand, federal support can improve the school quality and quantity; on the other hand, the federal expenditure on education may also give financial support to students, such as supplying a scholarship, etc. Nowadays, most students who choose to study abroad
support themselves by private fund. Financial aid is dramatically important to them to continue their studying. All these supports will attract more students to come and study in United States from all over the world.

Invol
Just as expected, the globalization involvement level of source country is positively associated with international student mobility in the all estimated model. The more a country is involved in global economy, the more students choose it as their destination to study abroad. However, in most of results we see that both the coefficient and the t-value are small. Thus, under some condition we can ignore this variable.

Young generation population
The sign of this variable is positive and t value is significant in the all estimated model. This outcome is obviously, higher proportion of young population; more students choose to study abroad. A large amount of young generation population will lead to lack of education resource seriously. The supply of education cannot satisfy the increasing demand. In consequence, many students have to look for the chance of study in other countries. What’s more, more young generation will bring about high pressure on employment. International students could look for other opportunities in host country.

Distance
We only use ordinary OLS and OLS without dummy variable to estimate the value of distance. The coefficient is negative in the all estimated model which implies that the longer distance between host and source country the lower will the enrollment of international students from the source country be. The expensive travel cost and cultural differences are main factors to block international student mobility. This variable is significant in both two different estimation results.
PPP

We expected a negative sign on the Purchasing Power Parity variable. The higher purchasing power exchange rate would lead to smaller enrollment number of international students. But we get a positive sign in the all estimated model. Hence, it is contrary to our assumption. Here are some reasons which we think that may cause the opposite coefficient sign: firstly, the data we use mostly is aggregated data and only get 14 years data for each country, the small sample size may not get accurately estimation result. If we put a lower level of aggregation data and longer time period we may get better estimation output; secondly, Purchasing Power Parity consider the living cost and the inflation problem of different countries, so living expense and exchange rate are the two main impact factors which influence PPP strongly. We have estimated the relationship between international student enrollment and relative living expense and also for exchange rate before use PPP variable. As a result, we find relative living expense has doubtless negative impact on enrollment but ambiguous coefficient sign for exchange rate. Because the change of exchange rate is unstable and complicated, so this may another reason to explain why we get an opposite sign. However, fortunately the coefficient of this variable is too small to take into consideration for all estimated results. According to the results which we estimated we can say that the change of Purchasing Power Parity has little effect on international student mobility in our model.

5.3 Suggestions

As an emerging and large potential trade business, study mobility attracts more and more students and countries to engage into it. Out of different purposes, the main three sides in this industry need to make a great effort to enhance study mobility under the background of globalization.
Source country

Students studying abroad have become the main manpower demand of many source countries. Better understanding of other countries’ culture and languages has become their greatest advantage. Furthermore, it is the right thing that source countries need in order to engage in global economy trend. The governments of source countries could encourage study oversea from three factors mainly. Firstly, the government should provide more fiscal support to students which can help many excellent students to release the pressure of the expensive cost and provide more opportunities to them. For example, source countries could increase the number of student studying abroad at government expense. In additional, the policy support is also very necessary. The government should simplify the process of studying abroad. Providing some preferential treatments to the students who are willing to go back after graduated could also be a good measure to attract talent people. Finally, we think governments could take the advantage of their special status to gain more relevant information. They can publish the latest information related studying abroad to common people through many media channels, such as internet, newspaper, radio and so on. It is helpful for students to make right decision in time.

Host country

As the output side of education resource, host countries need do more activities to attract more students from all over the world. First of all, host country should provide more support from both fiscal and policy. From fiscal aspect, government should expense more proportion of GDP on education. On one hand, it could enhance the quality of education. The education institution could buy better equipments and engage more talent people as teachers and researchers. On the other hand, government supports could be favorable to reduce tuition fee and provide high scholarship and so on. All of these would reduce student’s burden of studying abroad. From the policy standpoint, host country should have more positive attitude to international students.
For example, they could extend their visa policy. We also take United States as an example. If it tightens its visa policy on foreign students, potential applicants may choose other destinations. Secondly, education institutions of host countries should raise their education quality in order to have a competitive state. It has much relationship with how the graduate certification from the host country will be approved. Creating a better studying environment to international students is quite useful to show their advantages. If host country could provide perfect career planning and job opportunity to the students, it must receive a great deal of attention in the field of studying abroad.

Personal
After analysis, we find that the main factors which have greatest effects on students are almost come from financial problem. To personal, they should have a better preparation on financial support. They also should enhance their language competence to have a smoothing communication with local people. It can help the students to adapt the new environment as soon as possible.
6. CONCLUSION

The main purpose of this paper is to investigate the determinants behind international student mobility; i.e. to find what kinds of factors could influence international student mobility and to what extent they have an effect on mobility. The secondary purpose is to give suggestions for host country, source country and also students who want to study abroad. To this end, a pooled cross-section time series econometric model has been estimated, the estimation covering the period of 14 years from 1993 to 2006.

The main estimation results indicate that tuition fees, government support and young generation population have significant impacts on international student mobility. Among them, tuition fees, relative living expense and distance has negative effect. The opposite sign is obtained for: government support, global involvement and young generation population that all have positive effects on international student mobility.

For recommend part, to the extent that international student mobility is beneficial to host and source countries, it seems that reasonable that both host country and source country should give policy and fiscal support to students who study abroad. For students themselves who plan to study abroad, they should have sufficient preparation on finance and spirit.

In this thesis there are several limitations. First, the focus of the study is limited to the U.S. because of lack of data sources of other main host countries. The second limitation of the study relates to the nature of some of the data used in the empirical model.

Future research may focus on the impact of source countries which have greater student mobility; international student mobility changes on special period such as economic crisis and what measures should be taken which source country attracts student come back after abroad study.
REFERENCES

1. Altbach, P.G. (1998), Comparative Higher Education: Knowledge, the University, and Development. Hong Kong: Comparative Education Research Centre, The University of Hong Kong, P240.


