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國際學碩士 學位論文

**The Determinants of Worldwide International Student  
Mobility in Higher Education:  
a Gravity Model Approach**

전 세계 국가간 고등교육 단계 학생이동의 영향요인 분석:  
重力模型의 이용

2013 年 02 月

서울대학교 國際大學院  
國際學科 國際地域學專攻  
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**The Determinants of Worldwide International Student  
Mobility in Higher Education:  
a Gravity Model Approach**

A Thesis Presented by

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Graduate Program in International Area Studies  
For the degree of Master of International Studies

February 2013

The Graduate School of International Studies  
Seoul National University

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# **The Determinants of Worldwide International Student Mobility in Higher Education: a Gravity Model Approach**

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## **Abstract**

The increase in international student mobility worldwide suggests that research in this field of study is growing in significance. This paper examines the overall international student mobility patterns and explores into the theoretical predictions on what factors determine the international student migration flows. The primary purpose of this paper is to investigate the empirical determinants affecting the flow of international students in higher education across nations at a worldwide scale, by means of an econometric regression analysis. The secondary purpose is to give tentative policy recommendations which could contribute to the promotion of international student mobility and the internationalization of higher education for countries, both as host and home countries.

Traditionally, a large part of the previous higher education empirical studies using econometric methods has been concerned with flows of students from developing countries to industrialized countries or focused on single-country (typically the United States) or countries clustered according to their characteristics. Taking this fact into account, this study makes its own distinctive contribution to the existing literature by tackling worldwide-level ISM (International Student Mobility), taking into consideration 50 both developed and lesser-developed countries as host and home countries. Using pooled cross-sectional time series data over the time period of 1999-2009, this paper estimates an econometric model of international student flows worldwide. The total bilateral flows of students between 50 countries are set as dependent variables. The gravity model is used to reveal the factors determining foreign students' flows in higher education. A mixture of both economic and non-economic, macro and micro, traditional and innovative variables were tested such as: GDP per capita, unemployment and inflation rate (as proxy for market size and stability), the number of national higher educational institutions in the Academic Ranking of World Universities and R&D expenditure (as proxies for quality of education). Distance, both physical and cultural, was also factored into the equation. Dummy variables such as Common border, Common language, Colonial ties in the past, etc. were tested to find out whether they are important predictors of international students' flows. Many variables were found to have significant influence on the flow of international students. Based on the findings, this paper concludes with a discussion of the implications for international student mobility and higher education.

**Keywords: international student mobility, internationalization, higher education, international business, gravity model.**

*Student Number: 2010-22407*

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## **Abbreviations**

CEPII: Centre d'Etudes Prospectives et d'Informations Internationales

CIA: Central Intelligence Agency

EM Algorithm: Expectation-maximization algorithm

EU: European Union

FDI: Foreign Direct Investment

GDP: Gross Domestic Product

GEE: Government Expenditure on Education,

GERD: Gross domestic Expenditure on Research and Development

IIE: Institute of International Education

ISCED: International Standard Classification of Education

ISM: International Student Mobility

Migration DRC: The Development Research Centre on Migration, Globalization  
and Poverty

OECD: Organization of Economic Cooperation and Development

OLS: Ordinary Least Squares

Residual DF: Residual Degrees of Freedom

RTA: Regional Trade Agreement

UIS: UNESCO Institute for Statistics

UK: United Kingdom

UNCTAD: United Nations Conference on Trade and Development

UNESCO: United Nations Educational, Scientific and Cultural Organization

UOE: UNESCO/OECD/EUROSTAT

US: United States

WES: World Education Services

WTO: World Trade Organization

# I. Introduction

## 1.1. Motivation and Purpose of Study

Gradually, the world has become more intertwined than ever before due to the innovations in technology, information, and communication tools. Globalization has brought increased mobility across borders. Reflecting this trend, the international mobility of students has also recorded all-time high in history. The number of internationally mobile student in the world has increased from 1.6 for the year 1999 to 3.1 million for the year 2009 according to data provided by UIS (United Nations Educational, Scientific and Cultural Organization Institute for Statistics).

Until recently, only the mobility of goods and capital has usually been observed using the gravity model. However, mobility across borders also includes that of humans as well. With newer vessels of transportation and technology, human beings have migrated more than ever around the globe for different purposes. Nevertheless, so far, quantitative, empirical studies focusing on international migration by Korean scholars are few, with the exception of Huh, Kim and Lee (2003) and Lee (2004). Moreover, most studies on the movement of people have dealt with the labor migration and the mobility of tourists, and there have not yet been many studies which involve the migration of students. Instead of focusing on the migration of tourists, businesspeople and government workers, this study will focus on the migration of students across the world.

This research examines the broader global implications of student mobility pattern, both short and long term. The results of this research have significant

macroeconomic and political implications in a number of ways. First of all, in the business and education aspect, as universities must engage with “internationalization” against an economic background of “globalization”, identifying the factors that influence the flow of international students will give them insight as to how they should strategize to attract more international students.

Another aspect to be considered is the regional and labor dimension of international student mobility. International student mobility creates a flexible higher education employment sector and a sense of an international identity. In the case of Europe, the European Union and associated states consider the mobility of students as an element of a policy to encourage all Europeans to be mobile, whether in employment or in study and this to create both a more flexible workforce, and a European society engaging citizens with an experience of a European identity (Byram and Dervin, 2008). Discovering the factors that influence student mobility can shed light on the path that countries should take towards the future of a more integrated region.

There are many variables, both economic and non-economic, that could determine student mobility. This study will be conducted with the initial questions such as: Do flows of student migrants respond to economic determinants? If yes, which ones? Do non-economic variables - such as geographical, cultural and demographic factors - shape cross-country student migration patterns?

## 1.2. Definition and Distribution of International Students

OECD classified “international students” as those who travel to a country different from their own for the purpose of tertiary study. Despite that, the definition of international students varies in each country in accordance to their own national education system. In this research, an international student will be defined as a student who (1) is a citizen or permanent resident of a country other than that in which he or she intends to study; (2) has a legal residence outside the country that he or she intends to study in; and (3) is or proposes to be in the host country solely for educational purposes on a temporary student visa (UN Migration Report, 2008).

The main purposes and benefits of studying abroad are to improve language skills and to advance specialized studies. In some cases, students choose to study abroad because of the gap between the quality of education in home and destination country which results in foreign tertiary education degrees, being honored more than a local one. They are known to move past their cultural differences and learn a new language as well as new cultures (Cieslak, 1955). Today, cross-border education, the international mobility of students and teachers, educational programs or institutions of higher learning is being increasingly driven by economic considerations (Knight, 2004). Many view that improving the reputation of their country’s higher education as an element of prestige and a source of income giving them a competitive edge. Students themselves see it as a further boost to their career both in their home country and on the international job market, or even as an investment towards possible future emigration (UN World Migration, 2008).

The international mobility of students is on continuous rise. In the UNESCO (United Nations Educational, Scientific and Cultural Organization) 2009 World Conference on Higher Education report, there were more than 2.5 million students studying outside their own country. UNESCO also predicted that the number of international students might rise approximately to 7 million by year 2020. According to OECD (Organization of Economic Cooperation and Development) statistics, the number of students who study outside of their home countries at the tertiary level (ISCED 5 and 6) in 2009 has increased nearly four times from the one of the mid-seventies.

A closer observation of student migration data regarding the distribution of students worldwide gives more insight into the trend of ISM. The countries that have the highest number of international students are US, UK and Australia. In terms of straight numbers, the US is the undisputed front-runner with approximately 671,616 foreign enrollment in 2008-9 (Lewin, 2009), followed by the UK and Australia, respectively with 330,000 and 280,000 registered overseas students (WES, 2007). In 2007, the US accounted for 21.4% of foreign enrolments, the UK 12.6%, France 8.8%, Australia 7.6%, Germany 7.4%, and Japan 4.5% (UNESCO, 2009).

Three of the five highest receiving countries by volume of foreign students in higher education (US, UK, Germany, France, and Australia) are European (OECD stats). The main region receiving foreign students is Europe, which has approx. 840,000 international students. However, the majority of this figure comes from students moving from one European country to another (UNESCO, 2009). There is a huge imbalance in ISM, with 60% of the world's mobile students studying in just these major host countries

(UOE and UIS). OECD countries receive approximately 85% of the world's foreign students with the majority concentrated in just 6 countries.

As middle powers, Germany and France are best understood as secondary higher education destinations, with approximately 20% of world's foreign students, or 515,000 out of the 2.7 million students studying outside their countries in 2006 (WES, 2007). Japan, Canada and New Zealand are also perceived as evolving destinations for international students. In 2006, Japan, Canada and New Zealand together shared roughly 13% of the international student market, with approximately 327,000 of the 2.7 million students who traveled abroad for the purposes of higher education. Canada has seen a large increase in the number of Indian students, where the number of Indian students rose 280% in 2010 compared to 2008 (WES, 2007)

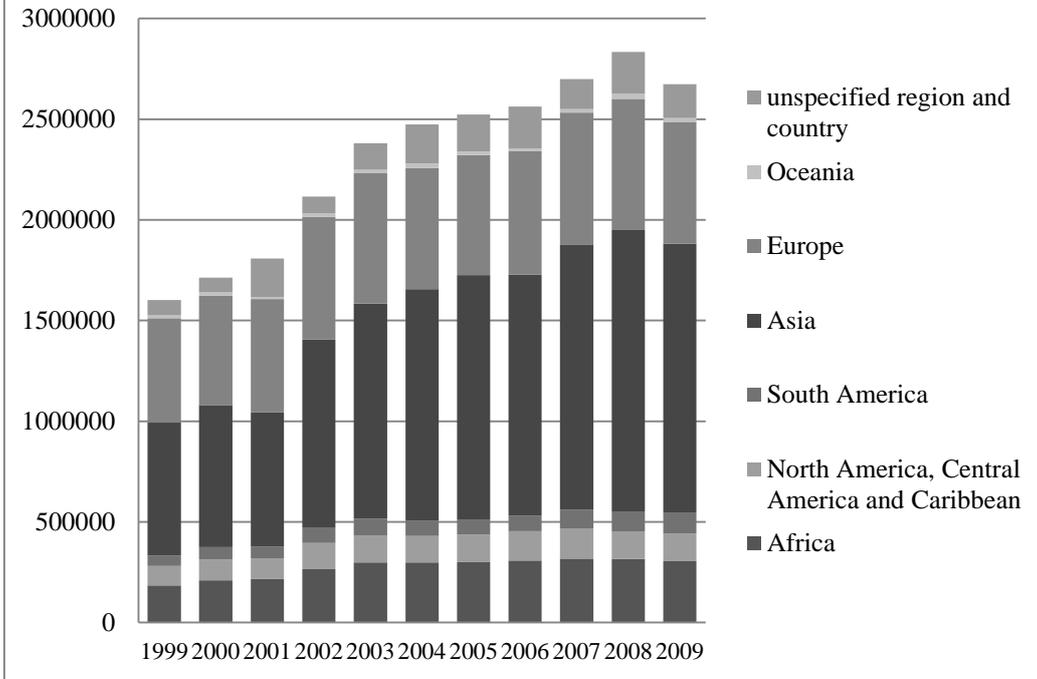
The largest sending nations of foreign students (China, India, Korea, Japan and Germany) are mostly Asian (refer to figures 1.1 and 1.2). Students from East Asia and the Pacific account for 29% of all international students in higher education. (Students from China account for 15% of this total.) North America and Western Europe account for 18%, then Central and East Europe 11%, South and West Asia 9%, Arab States 7% and Sub Saharan Africa 5.8% (UNESCO, 2009).

While most of the traditional host countries are seeing the numbers of international students continue to rise, newly emerging hosts in the developing world have entered the competitive higher education market and are re-mapping the unidirectional flow of global talent (Project Atlas, 2011). The sharpest percentage increases of international students have occurred in New Zealand, Korea, the Netherlands,

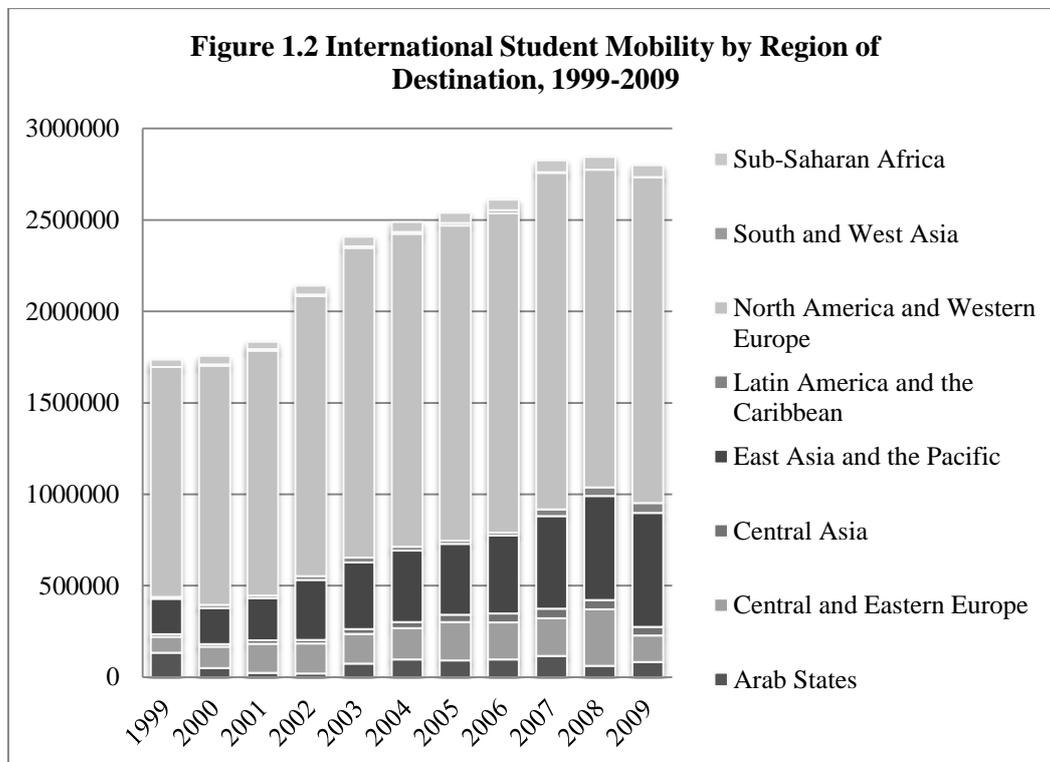
Greece, Spain, Italy and Ireland (OECD, 2010). In recent years, some Asian and Middle East countries started to attract more international students. These regions have entered the market with declared ambitions to become regional education centers by attracting as many as several hundred thousand international students to their countries (WES World Education Services, 2007).

The case of China is interesting both in terms of being a sender and also a destination country. In China, still to this day, higher-education system cannot meet the demand. In 2006, a record 10 million students throughout China took the national college entrance test, competing for 5.7 million university slots (Marklein, 2009). Thanks to China's booming economy in recent years, more Chinese families were able to afford to pay for colleges overseas (USA Visa Bureau, 2010), which explains the number of Chinese students in the world. However, at the same time, China, along with Malaysia, and Singapore, is the emerging destinations for international students. These three countries have combined share of approximately 12% of the global student market with somewhere between 250,000 and 300,000 students having decided to pursue higher education studies in these countries in 2005-6 (WES, 2007).

**Figure 1.1 International Student Mobility by Region of Origin, 1999-2009**



Source: Author's computation using data from UIS



Source: Author's computation using data from UIS

## II. Literature Review

### 2.1. Overview

Through a comprehensive literature review, this research highlights different dimensions and approaches that had been undertaken for both empirical (quantitative) and anecdotal (qualitative) studies on ISM (refer to Table 2.1). The different approaches and theories that have been used for the study of ISM are also discussed.

Among various strands of literature consider the factors influencing the choice of higher education, many studies traditionally have approached ISM through the discipline of international business/economics (Choi, Tschögl & Yu, 1986; Yu & Ito, 1988; Terpstra & Yu, 1988; Hennart & Park, 1994; Sethi, Guisinger & Berg, 2003), and through the field of higher education (Agarwal, 1983; Cummings, 1984; Haug, 1996; Jimenez and Velasco, 2000; Chen & Barnett, 2000; Li & Bray, 2007). More recent works such as Tay (2009) have cross-breed theories and determinants from these past studies.

One example of analyses through the international business/education dimension was the attempt to apply the supply and demand relationships formed in ISM through the push-pull model/theory (Li & Bray, 2007). These studies tied in the phenomenon of ISM with the establishment of the global market for international higher education, explained in terms of an interaction between supply-side factors and demand-side factors. Basically the idea is that 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, creating a supply and demand relationship and a market for international higher education.

However, the broad review of both the business and education literature reveals a lack of research into the drivers of ISM with most studies addressing the foreign study phenomenon taking an educational perspective focusing on curriculum development and delivery issues (Naidoo, 2007)

More recently, in the studies on ISM, other dimensions have received more attention. Works such as Chellaraj et al. (2005) contend that international graduate students have a significant impact on the development of the host countries economy. Industrialized countries have been competing to attract talent from overseas due to the shortage of highly educated labor force. This phenomenon is also well-known as “brain gain/drain”. Capuano (2009) argues that studies on ISM have so far not coupled with deep economic analysis of its causes. In the past, international student mobility has been focused on with the purpose of assessing the overall status of education systems, without attributing any explanatory role to economic and labor market perspectives. The study of highly skilled migration had usually been connected to workers' mobility, disregarding mobility to study as another side of the same phenomenon. Thus this study observes ISM in the context of highly skilled worker migration.

Still some other papers, notably Van Bouwel and Veugelers (2010), approach ISM with more specific elements of focus such as the quality dimension. Van Bouwel and Veugelers (2010) place an emphasis on the link that exist between student education choices and quality of education which is provided by the human capital theory of

education (e.g. Becker, 1964; Freeman, 1986). According to the human capital theory of education, individuals consider education as an investment decision and will undertake the costs of higher education in order to increase their future earnings and employment opportunities (Van Bouwel and Veugelers, 2010). Thus students will prefer to attend a high-quality institution, as a degree from a renowned university is likely to enhance their salary prospects and open doors to interesting jobs (Brewer et al., 1999). Some studies are supportive of the idea and found that students indeed match universities along quality (Hoxby, 2005; Epple *et al.*, 2006). Applied to the ISM context, this implies that students who chose to study in high-quality institutions overseas do so despite the extra costs of mobility have to be factored into the decision.

**Table 2.1 Overview of studies on the determinants of international student mobility**

Scope	Methodology	Authors, year	Title
Intra EU	Regression-empirical	Li and Wang, 2008	The determinants of International Student Mobility
		Van Bouwel and Veugelers, 2010	Does university quality drive international student flows?
		Gonzalez and Mesanza, 2010	The determinants of international student mobility flows: an empirical study on the Erasmus programme
	Qualitative	Hoareau, 2010	Financing EU student mobility: a Proposed Credit Union Scheme for Europe
		Kind and Ruiz-Gelices, 2003	International Student Migration and the European “year Abroad”:
		Ederveen and Thissen, 2008	European Coordination of Higher Education
		Teichler, 2007	The Changing Role of Student Mobility
World-	Mixture	Byram and	Students, Staff and Academic Mobility

wide		Dervin, 2008	in Higher Education
		King et al., 2004	International Student Mobility Study
	Descriptive	Verbik, 2007	International Student Mobility: Patterns and Trends
	Regression	Tay, 2009	Determinants of the flow of international students in higher education
	EM algorithm	Abel, 2008	Modeling International Student Migrant Tables
To US	Regression	Lee and Tan, 1984	The International Flow of Third Level Lesser Developed Country Students to Developed Countries: Determinants and Implications
		Cummings, 1984	Going Overseas for Higher Education: The Asian Experience
		Agarwal and Winkler, 1985	Foreign Demand for United States Higher Education: A Study of Developing Countries in the Eastern Hemisphere
	Case study	Szelényi, 2006	Students without borders? Migratory decision-making among international graduate students in the U.S.
	Qualitative	McMahon, 1992	Higher Education in a World Market: A Historical Look at the Global Context of International Study
		Kemp, Madden and Simpson, 1998	Emerging Australian education markets: A discrete choice model of Taiwanese and Indonesian student
To Australia	Survey analysis	Mazzarol and Soutar, 2000	Push-pull Factors Influencing International Students Destination Choice
To Germany	Regression	Bessey, 2007	International Student Migration to Germany
Intra-Asian	Qualitative	Sugimura, 2009	International Student Mobility and Asian Higher Education Framework for Global Network
		British council, 2008	International Student Mobility in East Asia
		Kell and Vogl, 2010	Global Student Mobility in the Asia Pacific: Mobility, Migration, Security and Wellbeing of International Students
		Ka, 2007	Questing for Internationalization of Universities in Asia: Critical Reflections
		Aphijanyatham, 2010	East Asian Internationalization of Higher Education: A Key to Regional Integration

		Malik, 2010	Student Mobility in Asia
Korean students	Survey analysis	Park, 2010	Analysis of Korean students' international mobility by 2-D model: driving force factor and directional factor

## 2.2. Empirical Studies

There is much research on the issue of studying abroad from educational and cultural perspective since ISM is an emerging field of scientific research. However, research on the determinants of studying abroad still seems to be lacking and through lack of research, much of the knowledge on the factors influencing international student mobility is anecdotally rather than empirically based (Naidoo, 2007). Table 2.1 provides an overview of the results from these empirical studies.

Traditionally, a large part of the previous higher education empirical studies using econometric methods has been concerned with flows of students from developing countries to industrialized countries, trying to understand their determinants and effects (Capuano, 2009). The majority of these studies focused on single-country (typically United States) or countries clustered according to their characteristics (such as OECD, developed or developing and particular regions in the world such as EU).

A recent work by Tay (2009) exposes this blank spot in the existing literature on ISM, where most researches focus on single-country or clustered countries according to their characteristics (OECD, developed or lesser-developed, partial regions (Cummings, 1984; Agarwal, 1983; Haug, 1994; Jiminez and Velasco, 2000; Chen & Barnett, 2000; Mazzarol and Soutar, 2002, Li & Bray, 2007)). She thus chose cross-nations data at a

worldwide scale, testing empirically a dataset comprising 26 host (developed countries) and 50 home countries (developing countries) based on 1244 observations with significant coefficients and  $R^2$ .

However, it is noteworthy that most of the existing literature, including Tay (2009) focuses only on students from developing nations choosing to pursue their higher education in developed countries. The literature does not shed light on reasons that students from developed countries choose to study in either developing countries or in other developed countries (Shenoy, 2002).

Taking this fact into account, this study adds to the existing literature by taking a slightly different, newer approach. It focuses on the worldwide-level ISM, taking into consideration 50 countries in the world that send out, or receive significant number of international students. These 50 countries are both developed and lesser-developed countries, and no distinction was made between home countries and host countries. All 50 were considered both as home and hosts at the same time. However, they were not exactly filtered for their representation because only the ones that were considered the world's top senders and hosts of ISM in higher education were considered, which discards countries from certain parts of the world such as Africa and Latin America.

This research was initially set out to benchmark the previous studies such as the one conducted by Lee (2004) where the effects of general variables (GDP, distance, RTA membership, etc.) were tested on trade and human mobility with satisfactory results, and also Laura Thissen and Sjeff Ederveen's work <Higher education: Time for coordination on a European level?>, where intra-European student mobility has been dealt with.

However, in the course of the research, many other works by foreign scholars on the same topic but with different focus were also consulted, such as <International Migration: A Panel Data Analysis of Economic and Non-Economic Determinants> by Anna Maria Mayda, <Net migration estimation in an extended, multiregional gravity model> by David K. Foot and William J. Milnet, <National borders, trade and migration> by Hellinet.

Many of these studies recognize their inadequacies that arise from taking a biased approach to ISM. For example, Van Bouwel and Veugelers (2010) say that their macro-analysis fails to get a full grip on the multi-faceted phenomenon of ISM and that their findings should therefore be seen as a part of bigger research agenda Van Bouwel and Veugelers, 2010). They could only conclude that at the macro-level, several different quality indicators appear to help explain the size and direction of student flows, but to confirm it, bolder conclusion, additional research at the micro- and meso-level should be done.

The econometric analysis of the importance of the factors driving ISM is somewhat well-established, producing robust findings, especially for groups of developed countries with ample data such as those in the European Higher Education Area or OECD.

### III. Methodology

#### 3.1. Model specification

Gravity models have been used as the standard technique for the empirical analysis of inter-regional and international bilateral flows of goods and capital (Gonzalez et al., 2010). The basic idea of the Gravity model equation is that any interaction between a pair of countries is modeled as an increasing function of their sizes and a decreasing function of the distance between the two countries (Sen and Smith, 1995; Frankel and Rose, 2002).

While the gravity equation was used with reference to trade and investment flows, the logic of the gravity model also underlies migration studies (Karemera *et al.*, 2000; Gonzalez and Maloney, 2005; Mayda, 2005; Peri, 2005). The underlying logic of applying the gravity model to movement of people was first set out by Zipf (1946). Then the gravity model was applied to tourism, migration of labor force, and that of students.

Applied to the movement of people, the gravity model holds that the number of migrants between two countries is directly proportional to the population in each region/country and indirectly proportional to the squared distance between the out- and the in-migration country (Gonzalez, 2008). This standard international-migration model is also valid for ISM. The likelihood of a student moving from any home country should increase as the population of that country increases, holding other factors constant. On the other hand, the likelihood of a student moving to any host country is to increase as the population and wealth of the host country increases, because potentially-large host

countries have more universities. Geographical distances between the two countries can be used as a proxy for travel costs and cultural differences that have a negative sign in the gravity model.

Karemera et al. (2000) have derived the reduced form gravity equation for international migration from supply and demand forces, replacing the mass of the objects under consideration in Newton's original law. The equation for migration in its most basic form thus looks like:

$$F_{ij} = \frac{\alpha_0 S_i^{\alpha_1} D_j^{\alpha_2}}{R_{ij}^{\alpha_3}} \quad i = 1, \dots, N1; j = 1, \dots, N2 \quad (1)$$

where supply  $S_i$  is a function of income in the home country, population size, and factor endowments. Similarly, demand  $D_j$  is a function of income and population in the host country. And these in turn affect international migration flows,  $F_{ij}$ .  $R_{ij}$  represents different factors that promote or deter migration, such as distance, visa regulations, or the political situation in the country of origin. Buch et al. (2004) note that the constant in an empirical application (using OLS regression and a log-log specification) of the gravity equation also captures distance costs (Bessy, 2007).

This form is easy to estimate with OLS and the coefficients have a convenient elasticity interpretation. Additional explanatory variables were added to increase the explanatory power of the model. These relate to characteristics of the host country ( $HCI$ ),

the sending country ( $SC_j$ ) and include variables describing the relationship between the host and sender ( $R_{ij}$ ) which are expressed in dummy forms.

For this particular empirical application to the case of ISM, the following loglinearized form of the gravity equation was used:

$$\begin{aligned} \log(STU_{ij}) = & \beta_0 + \beta_1 \log(GDP_i) + \beta_2 \log(GDP_j) + \beta_3 \log(POP_i) + \beta_4 \log(POP_j) - \beta_5 \log(DIST_{ij}) - \beta_6(U_i) - \\ & \beta_7(INFLA_j) + \beta_8 \log(FDI_j) + \beta_9(MIG_j) + \beta_{10}(COL_{ij}) + \beta_{11}(REL) + \beta_{12}(CONTIG_{ij}) + \beta_{13}(RTA_{ij}) + \\ & \beta_{14} \log(STOC_{ij}) + \beta_{15}(OPP_i) + \beta_{16}(QUAL) + \beta_{17}(GERD) + \beta_{18} \log(INTER_j) + \varepsilon_{ij} \end{aligned} \quad (2)$$

where

$STU_{ij}$  is the enrolment of students with citizenship of country  $i$  who are enrolled in a regular tertiary educational program in country  $j$ ,

$POP_i, POP_j$  is population in country  $i$  (country of citizenship) or  $j$  (host country).

$GDP_i, GDP_j$  is GDP per capita in country  $i$  or  $j$ .

$DIST_{ij}$  is the physical distance between the capitals of two countries  $i$  and  $j$ .

$U_i, U_j$  is the unemployment rate in country  $i$  or  $j$ .

$INFLA_j$  is the inflation rates in country  $j$ .

$COL_{ij}$ , is the dummy variable that shows whether colonial ties exist between  $i$  and  $j$ .

$REL_{ij}$ , is the dummy variable that shows whether countries  $i$  and  $j$  share the same religion.

$CONTIG_{ij}$ , is the dummy variable that display whether two countries share a border.

- RTA<sub>ij</sub> is the dummy variable that display whether two countries share the same Regional Trade Membership.
- FDI<sub>j</sub> is the F inflow to country j.
- MIG<sub>j</sub> is the migration rate of country j.
- STOC<sub>ij</sub> is the average number of international student in j from i during 5 years prior to the year in question.
- OPPi is the percentage of students enrolled in tertiary education in country i, a measure of educational opportunities.
- QUAL<sub>j</sub> is the number of universities among the top 500 in the world.
- INTER<sub>j</sub> is the number of internet users at country j.

Other variables were tried out as well, which the next section explains in detail.

### 3.2. Variables and Hypotheses

In this section a list of the variables used for the regression will be examined, each with detailed explanations. As shown in the literature review section, many authors on ISM have classified the variables of choice with potential explanatory power according to the theories and approaches they used. Examples of more recent works are: Tan (2009), classifying the variables into macro and micro. Other works have used the pull and push factors derived from the push-pull model/theory (Li & Bray, 2007). Naidoo (2007) classified the reasons behind ISM in economic, political and socio-cultural (refer to Table 3.1)

**Table 3.1 Integrated conceptualization of the Literature on ISM**

	Examples	Grounded in
Social/cultural reasons	Affinity between host and source countries, pedagogical/academic reputation of educational institutions in host country, potential migration opportunities in host country, Geographic/cultural proximity of host country	Human capital and Education literature, consumer behavior literature, migration literature, cross-cultural literature
Economic reasons	Tuition fees in host country, exchange rate between host and home, cost of living in host country	Student demand studies, orthodox demand theory
Political reasons	Promotion of foreign policy, country development through education aid	Interdependence theory, world systems theory, development theory

Source: Naidoo (2007), Research on the flow of international students to UK universities, determinants and implications

As pointed out in the previous chapters, the trend of ISM results from a range of many different, not mutually exclusive factors, such as: greater mobility of skilled individuals and workers in a globalized economy; the falling costs of transport and communication; the desire of countries to encourage university and cultural exchanges and to attract highly qualified personnel; the wish on the part of tertiary institutions to generate additional income or increase their prestige and raise their profiles, both nationally and internationally; or the need for a better educated workforce in emerging economies where local capabilities are often quantitatively and qualitatively insufficient (World Migration Report, 2008).

The above realizations clearly reveal that understanding student mobility is by no means an easy task, since many determinants are likely to play similar roles and interact, and many others are not quantifiable, let alone measurable at all: among the latter, for

example, the reputation of academic institutions in the host countries and their attitude toward international students, reflected in their policies to attract them, are to be borne in mind when analyzing student mobility, even if, in most cases, it is not possible to control for them empirically (Capuano, 2009).

As this paper took a more comprehensive approach in finding the determinants of ISM, it considered numerous variables that were used by other studies and has rearranged them, to overarch different types and aspects of the variables. At first, over 30 variables, such as GDP (Gross Domestic Product) per capita, Percentage of female students Total tertiary, Enrolment in total tertiary Public and private Full and part time Total, School age population-Tertiary-Total, Enrolment in lower secondary. Public. All programs. Total, Public current expenditure on education as % of total current government expenditure, Public expenditure on education as % of GDP, Public expenditure per pupil as a % of GDP per capita. All levels, Total expenditure on educational institutions and administration as a % of GDP. All sources. All levels, Pupil-teacher ratio, Secondary GERD (Gross Domestic Expenditures on Research and Development) as a percentage of GDP, GERD per capita, Total Administrative Units, Total population, GDP growth rate, Poverty (% of pop. on less than \$2 a day), etc. were each used and tested to determine which of them have enough explanatory power to be injected into the real equation. Then the variables were classified into a comprehensive table (refer to Table 3.2)

**Table 3.2 Variables used for the study of ISM**

Pull/Push	type	Explanatory Dependant Variables	Source
Push factors (home)	Traditional macro-economic	Market size: GDP per capita (PPP) US\$	UN statistics
		Unemployment rate	OECD
		Purchasing Power Parity/Inflation rate	CIA Factbook
	Demographic /social	Enrolled students, tertiary	UIS
		School age population	UIS
		Enrolment rate from secondary to tertiary	UIS
		Gender equality: Percentage of female students. Total tertiary	UIS
		Net Migration rate	World Bank
Pull factors (host)	Macro-Economic	GDP growth rate	CIA Factbook
		GDP per capita (PPP) US\$	UIS
		Openness (Global involvement of the source country): FDI inflow	UNCTAD
		Openness (Global involvement of the source country): trade openness	UN Comtrade
		Unemployment rate	CIA Factbook
		Inflation rate	CIA Factbook
	Economic-Quality	Host country expenditure on higher education/GDP	UIS
		Number of universities in the Top 500 of World Universities	Shanghai Jiao Tong University
		Pupil-teacher ratio	UIS
		GERD as a percentage of GDP/per capita	UIS
	Demographic /social	Enrolment in total tertiary	UIS
		International Students, stock	UIS
		Immigrant Population, stock	Global Migrant Origin Database
	Distance between host and home country	Physical	Geographic distance
Cultural/social		Linguistics dummy (common language)	CEPII
		Shared border dummy	CEPII
		Past historical colonial ties between a home country and a host country	CEPII
		Religion	CIA Factbook
Economic		Economic distance	Calculation with data from UIS

Each variable are representatives or proxies for the hypothesis that this paper makes in order to determine the forces that leads to ISM. Each will be discussed as follows in regards to the hypotheses that are made, along with detailed explanation of how each data was collected and treated:

First, for the home country (where students are originally from), Push factors, also called supply-side factors were identified and used. The term refers to factors that push students to seek higher education in countries other than their native countries. These can include poor educational facilities in certain subjects, social discrimination, limited openings at the university level, and an array of political and economic factors at home (Shenoy, 2002).

Macro-economic factors at home such as market size and/or economic strength (proxied by GDP per cap), employment perspectives (proxied by unemployment rate), and market volatility (proxied by inflation rate) are naturally thought of as factors that influence outward student mobility. GDPi is known to have a negative sign, unemployment and inflation rate at home, positive.

Social factors such as domestic opportunities for higher education for individuals were proxied by the enrolment rate for tertiary education. The higher percentage of students that enroll in university from high school in a country is known to lead to the lower outbound mobility. Inversely, Limited Opportunities for higher education in a home country is positively correlated to the out flow of students international to other countries from home to host countries (Tay, 2009). Also, to proxy the level of social

discrimination (in gender) at the home country, the percentage of female students enrolled in tertiary education was injected into the equation.

For the host country, pull factors, which refer to incentives that pull students towards host countries are at work. These factors include availability of scholarships, better facilities, political ties, cultural and linguistic similarities with the host country, and finally the hope that a foreign educational credential will help in obtaining a better job on their return to their home country (Shonoy, 2002).

Macro-economic variables for the host country such as market size, stability and dynamism (proxied by GDP per capita and GDP growth rate) are assumed to have a positive sign. Employment and permanent migration opportunities (proxied by unemployment rate, expected to have a negative sign) also influence a host country's appeal to foreign students.

The demographic/social variables of the host country that influence student flows that were taken into account were the migrant stock in the host countries from the nationalities that match the students'. Global Migrant Origin Database by Development Research Centre on Migration, Globalization and Poverty (Migration DRC) provides a 226x226 matrix of origin-destination stocks by country and economy, which is an extension of the basic stock data on international migration that is published by the United Nations. The data are generated by disaggregating the information on migrant stock in each destination country or economy as given in its census. The reference period is the 2000 round of population censuses, so the data do not refer to precisely the same

time period, and it was recently updated in 2007. For this reason, migrant stock was used only for the years 2007, 2008, 2009 in this paper.

The international student stock is the average number of international student in a specific country from a specific sending country during 5 years prior to the year in question.

For the host country, another critical dimension to look at to reap significant variables is the quality of education. This could be detected by different factors: the level of commitment to higher education by the host government proxied by government expenditure on education (in percentage of GDP), which is positively correlated to the inflow of international students to a host country; the reputation of higher educational institutions in the host country, and the level of GERD in terms of GDP.

Another measure of quality used for this paper was the reputation of universities in the host country, measured by the number of universities among the top 500 in the world. This measurement was based on the Academic Ranking of World Universities, also referred to as the Shanghai ranking. The Shanghai Ranking uses a broad set of indicators to measure the quality of universities. This ranking, compiled annually by Shanghai Jiao Tong University, ranks universities on the basis of alumni and staff winning Nobel prizes and Fields medals, the number of ISI highly cited researchers, the number of articles published in Nature and Science, the number of articles in the Science Citation Index Expanded and the Social Science Citation Index and the size of the university (Liu and Cheng, 2005). The Shanghai ranking may not be completely reliable in its 'correctness' to measure quality, but nevertheless it attracts a lot of media-attention.

It may therefore be one of the information sources prospective students are likely to use when they decide which university in which country to apply for (Van Bouwel and Veugelers, 2010).

**Table 3.3 Number of universities among the top 500 in Shanghai ranking**

USA	170	Spain	9
Germany	43	China	8
UK	42	South Korea	8
Japan	36	Switzerland	8
Canada	23	Belgium	7
Italy	23	Austria	5
France	22	Denmark	5
Australia	14	Finland	5
Netherlands	12	Brazil	4
Sweden	10	Norway	4

Geographical distances have traditionally been known to be negatively correlated to the inflow of international students from home to a host country. There are two kinds of distance measures: simple distances, for which only one city is necessary to calculate international distances; and weighted distances, for which data on the principal cities in each country is needed. For this study, the simple distances were used. The simple distances are calculated following the great circle formula, which uses latitudes and longitudes of the most important city (in terms of population) or of its official capital.

As well as geographical/physical distances, cultural distances can inhibit the flow of international students. Inversely, proximity to and close relations with the sending country (e.g. in the form of trade relations or former colonial links) are factors that

commonly attract students from a particular sending country (Tay, 2009). Cultural distances have been proxied in many different ways. In this paper, they have been done so by a number of dummy variables indicating whether the two countries have a shared border, language and religion, whether the two countries are contiguous, whether they have been parts of a same country in the past, and whether (historical) colonial ties between a home country and a host country exist. For the last one, many variables such as: common colonizer after 1945, colonial relationship after 1945, and current colonial relationship were summed up to one variable which denotes whether two countries have ever had a colonial link. This is due to the fact that many find that trying to give a precise definition of a colonial relationship is obviously a difficult task. Colonization is here a fairly general term that we use to describe a relationship between two countries, independently of their level of development, in which one has governed the other over a long period of time and has contributed to the current state of its institutions (CEPII).

The hypotheses regarding these dummy variables is that if a home country shares a cultural/social element in common, this common cultural/social link would be positively correlated to the inflow of international students to a host country flow of international students between them. The data for these dummy variables regarding cultural/social ties were collected from CEPII, which provides the bilateral data file, except for the religion dummy. World religion by country was consulted. This information was provided by CIA World Factbooks, from their rank ordering of religions in a particular country by adherents starting with the largest group and the percentage of the groups in terms of the total population. The different religions were: Roman Catholic,

Lutheran, Protestant, Russian/Eastern/Greek Orthodox, Daoism (Sunni) Muslim Anglican, and Shintoism/Buddhism.

Another dummy for social link, common RTA (Regional Trade Agreement) membership, was added to reflect whether trade relations or trade pacts between countries affect IMS. In the previous study by Lee (2004) for migration, RTA membership was used and was proven to have significance. The data for the RTA dummy has been compiled by the author using information acquired from the WTO website, in the regional trade agreements > RTA database > Search by country/territory section. A list of notified RTAs in force and of RTAs for which an early announcement has been made was found.

Relative economic distance between countries is usually measured by the absolute differences in countries' per capita income, but measured in this case by the following equation taken out of "Regionalism and the Regionalization of International Trade" (Gaulier et al., 2004).

$$ECODIS = \frac{\text{Min}\{PCI_i, PCI_j\}}{\text{Max}\{PCI_i, PCI_j\}} \quad (3)$$

Where  $PCI_i$  and  $PCI_j$  is country  $i$  and  $j$  per capita income. This variable did not have much significance in the equation so was dropped out.

The number of internet users has been proxied for the extent of internet usage in a given country, which can be interpreted as the level of development of information and communication channels. The Internet promises to be a very important tool of economic

development, allowing countries to integrate more fully into world markets and speeding the advent of globalization (Canning, 1999). Many such as Freund and Weinhold (2000) have already studied the effect of the Internet on bilateral trade using the number of web hosts as the proxy for the Internet and found that the Internet has stimulated bilateral trade. Choi (2003) observed similar effects of internet on FDI flows. This paper tries out the effects of internet on the migration of people, namely that of students at university level and above, who are perhaps the most sensitive group to information and communications.

The Net migration rate includes the figure for the difference between the number of persons entering and leaving a country during the year per 1,000 persons (based on midyear population). An excess of persons entering the country is referred to as net immigration (e.g., 3.56 migrants/1,000 population); an excess of persons leaving the country as net emigration (e.g., -9.26 migrants/1,000 population). The net migration rate indicates the contribution of migration to the overall level of population change. High levels of migration can cause problems such as increasing unemployment and potential ethnic strife (if people are coming in) or a reduction in the labor force, perhaps in certain key sectors (if people are leaving).

Some other variables that were considered but dropped were: Exchange rate, information provided by UNCTAD, climate, and the Political risk index.

### 3.3 Data explanation/ Descriptive Statistics

The data on flows of international students (Fij) was collected from the UIS database on education. The data was provided by individual countries on the basis of commonly agreed definitions through yearly questionnaires.

The number of internationally mobile students in a country was classified into their country of origin, and only included those that were in tertiary level, level 5 and 6 in ISCED (International Standard Classification of Education) classification. The first stage of tertiary education is level 5, further subdivided into A and B categories. The former contains those programs with a theoretical orientation that give access to advanced research programs. The latter contains programs which are practically oriented or occupationally specific. The second stage of tertiary education, which leads to an advanced research qualification, is level 6. These programs require the submission of a dissertation based on original research which constitutes a contribution to knowledge in the relevant field (ISCED, 1997).

The countries for bilateral student mobility sample worldwide and also within Asia were chosen according to their data availability significance. Out of the 193 Member States (and the 7 Associate Members) of UNESCO, initially 75 countries with significant data were chosen then narrowed down to 50. The chosen countries are (in alphabetical order): Australia, Austria, Belgium, Brazil, Canada, Chile, China, Hong Kong Special Administrative Region, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, India, Indonesia, Iran (Islamic Republic of), Ireland, Italy, Japan, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Latvia, Lithuania, Luxembourg,

Malaysia, Mexico, Mongolia, Netherlands, New Zealand, Norway, Philippines, Poland, Portugal, Republic of Korea, Romania, Russian Federation, Saudi Arabia, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom of Great Britain and Northern Ireland, United States of America, and Venezuela (Bolivarian Republic of).

The total number of International (or internationally mobile) students in and out of each sample home and host country from the year 2009 was used as the independent variable first. Then, a panel analysis was run for a period of 11 years, from 1999 to 2009. The reason for this is that although availability for other educational indicators date back to 1975, actual data by UNESCO provided for the number of international students for most countries are from the year 1999 to 2009.

The panel data set will make it possible to exploit both the time-series and cross-country variation in student inflows and outflows. The dependent variable used for the panel regression is the number of students from a given country in a given country for the years 2004-2009. The stock of students is the average of the number of students in the 5 previous years. The available data is from the year 1999. Thus the years included in this regression is from the year 2004.

The summaries of the statistics of the cross-section and panel data for the independent and dependent variables are as below shown in table 3.4 and 3.5.

**Table 3.4 Descriptive Statistics (Cross Section, Estimation Sample)**

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
LNSTU	4.2	4.1	11.5	0.0	2.3	1361
LNGDPI	9.9	10.1	11.3	7.7	0.8	2450
LNGDPJ	9.9	10.1	11.3	7.7	0.8	2450
LNFDI	8.6	9.1	11.9	1.5	2.0	2500
LNPOPI	13.5	13.1	16.8	9.7	1.4	1736
LNPOPJ	16.7	16.6	20.9	12.7	1.6	2450
LNDIST	8.4	8.6	9.9	0.0	1.1	2500
UI	8.7	7.9	63.0	1.5	6.0	2250
INFLAI	3.1	1.7	27.1	-4.5	5.0	2500
LNSTOC	3.9	3.7	11.5	0.0	2.4	1636
MIG	1.2	0.9	16.2	-7.6	3.5	2500
OPPI	62.8	61.6	100.0	23.5	17.3	1750
LNINTJ	15.9	15.9	19.3	12.6	1.4	2300
QUAJ	9.5	2.0	170.0	0.0	25.2	2500
GERD_GDPJ	1.4	1.4	4.0	0.1	1.0	1600
COL	0.0	0.0	1.0	0.0	0.2	2500
CONTIG	0.0	0.0	1.0	0.0	0.2	2500
RTA	0.5	0.0	1.0	0.0	0.5	2500
RELIGION	0.2	0.0	1.0	0.0	0.4	2499

**Table 3.5 Descriptive Statistics (Panel, Estimation Sample)**

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
LNSTU	3.9	3.8	11.5	0.0	2.4	9487
LNPOPJ	14.0	13.7	20.9	2.9	2.1	13744
LNPOPI	13.6	13.9	16.8	7.9	1.4	13388
LNINTJ	15.7	15.6	19.3	12.2	1.5	11300
LNGDPJ	9.8	10.1	11.4	7.4	0.9	14850
LNGDPI	9.9	10.3	11.4	7.4	0.8	14949
LNSTOC	3.4	3.3	11.5	-1.6	2.6	11065

LNFDI	8.9	9.0	12.6	1.5	1.7	14250
LNDIS	8.4	8.6	9.9	2.5	1.1	15000
INFLAI	4.7	3.3	30.4	-4.5	4.4	14847
GERD_GDPJ	1.4	1.2	4.0	0.0	1.0	12250
MIG	1.5	0.9	53.0	-7.6	4.7	15000
OPPI	23.2	0.7	100.0	0.0	35.0	13637
QUAJ	9.9	2.0	1483.0	0.0	34.8	15000
RELIGION	0.2	0.0	1.0	0.0	0.4	15000
RTA	0.4	0.0	1.0	0.0	0.5	15000
UI	5.7	5.6	63.0	-0.3	4.1	14743
COL	0.0	0.0	1.0	0.0	0.2	15000
CONTIG	0.0	0.0	1.0	0.0	0.2	15000

## IV. Results and Analysis

### 4.1. Cross-Section Regressions Results

Since the previous studies by Lee (2004) and others show that the gravity model is very useful in explaining migration and human mobility, the results of the model could be somewhat predicted. The results of the model vary depending on the purpose of the mobility and the variables used, but once again, the determining factors, such as GDP, population, unemployment, distance, etc. were expected to roughly stay the same, with the same signs. Before conducting the research, this paper assumed that both economic and non-economic factors are likely to influence the size, origin, and destination of student mobility at each point in time and contribute to the variation observed in the data. The dependant variables that were estimated to influence student flows were all tested out in numerous different combinations and the ones that did not show statistical significance were left out. Table 4.1 reports regression results using variables with high significance.

**Table 4.1 Worldwide ISM Gravity Model Estimation Results (cross-section, OLS)**

	(1)	(2)	(3)	(4)	(5)	(6)
Log, Student population host	0.695*** (0.04)	0.763*** (0.05)	-0.223** (0.11)	0.314*** (0.09)	1.838*** (0.04)	-0.264 (0.31)
Log, Student population home	0.436*** (0.04)	0.436*** (0.04)	0.067*** (0.01)	0.355*** (0.04)	0.324*** (0.07)	0.074*** (0.02)
Log, Distance	-0.251*** (0.05)	-0.228*** (0.05)	-0.042** (0.02)	-0.148*** (0.05)	-0.095 (0.06)	-0.051 (0.03)
Log, GDP host	1.927** (0.11)	2.517*** (0.15)	0.359*** (4.02)	0.588 (0.16)	0.697*** (0.04)	0.074 (0.27)
Log, GDP home	0.362*** (0.07)	0.431*** (0.07)	0.089** (0.03)	0.418*** (0.08)	0.439*** (0.04)	0.133*** (0.05)
Log, FDI inflow, host	-- --	-0.002 (0.03)	-- --	-- --	-- --	0.103*** (0.02)

Unemployment, host	--	-0.001 (0.01)	--	--	--	0.020 (0.01)
Inflation, host	--	-0.000** (-0.01)	--	--	--	0.027 (0.02)
Log, Stock of foreign students	--	--	0.878*** (0.01)	--	--	0.843*** (0.02)
Migration rate	--	--	-0.013 (0.01)	--	--	-0.010 (0.01)
Educational opportunities	--	--	-0.002 (0.00)	--	--	-0.002 (0.00)
Internet users, host	--	--	0.319*** (0.11)	--	--	0.438 (0.35)
SR top 500 institutions, host	--	--	--	0.074*** (0.00)	--	-0.013** (0.00)
GERD/GDP	--	--	--	0.395*** (0.08)	--	0.234*** (0.06)
Colony	--	--	--	--	1.147*88 (0.33)	0.114 (0.15)
Shared border	--	--	--	--	0.891*** (0.31)	-0.068 (0.14)
RTA	--	--	--	--	0.267* (0.13)	-0.019 (0.09)
Religion	--	--	--	--	0.545*** (0.13)	-0.062 (0.06)
Constant	-34.586 (1.75)	-43.626 (2.31)	-4.041 (0.98)	-16.220 (2.36)	-35.003 (1.75)	-5.75 (1.91)
Observations	916	878	769	642	916	512
R-squared	0.421	0.481	0.923	0.523	0.449	0.905
Adjusted R-squared	0.418	0.476	0.922	0.518	0.444	0.901

*Notes:* Standard errors are reported in parentheses; \*, \*\*, \*\*\* indicates significance at the 90%, 95%, and 99% level, respectively; dependent variable: log of the number of international students

Table 4.1 reports the regression results of a series of gravity models for international student flows at the tertiary level. First, the variables of the gravity model in its simplest form are tested out as a benchmark case. They were: size as measured by student population of home and host, GDP per capita of home and host, and the geographical distance between them (column (1)). All the variables have the expected signs and most are highly significant. Then the different variables, grouped under the dimensions the paper previously talks about, were tested out one group after another.

The basic gravity model has some explanatory power, with an  $R^2$  of 0.421, and the variables have expected signs. All variables are significant at the 99% and 95% level and show considerable coefficients.

In the second column, the macro-economic variables were added, and the  $R^2$  was augmented slightly. They all had very minor coefficient and thus effects, but the interesting observation was that the Inflation and unemployment rate at host country had a negative sign, as somewhat predicted.

In the third column, the demographic variables were injected, with surprisingly high  $R^2$  of 0.923. The coefficient of the stock of international students, measured by the average number of students from a particular country in a particular destination country in the 5 years prior to the year in question, is large and highly significant, confirming the strong persistence through time in bilateral student flows. Due to the high persistency of student flows, past student flows somewhat absorb all the explanatory power of the model. Educational opportunities in the sending country are not significantly different from zero in any of the specifications. Perhaps educational opportunities are no longer a pressing issue in ISM except for a few exceptions.

In specification (4), additional host characteristics related to the quality and reputation are added. Higher government expenditure on Research and Development in the host country has a strong and significant positive effect on the size of incoming student flows. This was a better landmark than government expenditure on education. It was found that a 1% increase in Research and Development expenditure leads to an average 0.4% increase in the size of incoming student flows. Column (4) also includes the

university counts in the top 500 of the Shanghai ranking. This number is not so significant but has positive effect, increasing the number of incoming students by approximately 7% per one more institution within the top 500.

Column (5) includes the socio-cultural dummy variables. These have highly positive and significant impact on student flows. Colonial ties have the strongest significance. Language difference variable was tried out and was found to be less of a deterrent for international students, probably because of the widespread adoption of English in higher education. The lack of common RTA membership also seems to be not of a big issue.

## 4.2. Panel Data Estimations Results

A summary of the gravity model results of the panel data regression for each the independent variables are as below shown in table 4.2.

**Table 4.2 Worldwide ISM Gravity Models Estimation Results (2004-2009, OLS)**

	(1)	(2)	(3)	(4)	(5)	(6)
Log, Student population host	0.379*** (0.01)	0.237*** (0.01)	0.029*** (0.01)	0.205*** (0.01)	0.359*** (0.01)	0.038** (0.01)
Log, Student population home	0.283*** (0.01)	0.317*** (0.01)	0.213*** (0.01)	0.320*** (0.01)	0.274*** (0.01)	0.236*** (0.01)
Log, Distance	-0.181*** (0.02)	-0.197*** (0.02)	-0.114*** (0.02)	-0.256*** (0.02)	-0.021*** (0.02)	-0.016 (0.02)
Log, GDP host	1.021*** (0.03)	0.573*** (0.03)	0.536*** (0.03)	0.489*** (0.03)	0.999*** (0.03)	0.267*** (0.04)
Log, GDP home	-0.110*** (0.02)	-0.008 (0.02)	-0.069** (0.03)	0.004 (0.02)	-0.135*** (0.02)	0.007 (0.04)
Log, FDI inflow, host	-- --	0.490*** (0.01)	-- --	-- --	-- --	0.107*** (0.01)

Unemployment, host	--	-0.024*** (0.00)	--	--	--	-0.028*** (0.01)
Inflation, host	--	-0.075*** (0.00)	--	--	--	-0.064*** (0.00)
Log, Stock of foreign students	--	--	0.444*** (0.01)	--	--	0.372*** (0.01)
Migration rate	--	--	0.001 (-2.42)	--	--	-0.010** (0.01)
Educational opportunities	--	--	-0.001** (0.00)	--	--	0.001 (0.00)
Internet users, host	--	--	0.374*** (0.02)	--	--	0.088*** (0.02)
SR top 500 institutions, host	--	--	--	0.027*** (0.00)	--	0.022*** (0.00)
GERD/GDP	--	--	--	0.325 (0.02)	--	0.116*** (0.02)
Colony	--	--	--	--	1.677*** (1.94)	0.472*** (0.13)
Shared border	--	--	--	--	1.312*** (2.28)	0.862*** (0.12)
RTA	--	--	--	--	0.234*** (0.04)	0.073 (0.05)
Religion	--	--	--	--	0.528*** (0.05)	0.588*** (0.05)
Constant	-12.832 (1.91)	-13.009 (0.56)	-11.8887 (0.57)	-7.091 (0.55)	-13.717 (0.52)	-6.287 (0.71)
Observations	7741	7152	7447	6708	7741	4147
R-squared	0.202	0.302	0.328	0.344	0.249	0.554
Adjusted R-squared	0.202	0.302	0.327	0.343	0.248	0.552

Notes: Standard errors are reported in parentheses; \*, \*\*, \*\*\* indicates significance at the 90%, 95%, and 99% level, respectively; dependent variable: log of the number of international students

The first column includes the basic variables of the gravity model, with low a low  $R^2$  of 0.202. All of the coefficients are significant at the 99% level and the variables such as the log of Distance and GDP of home country show expected negative signs. All regression coefficients are significant: their values are more than twice their standard error (quick rule for significance at 5% level) and their t-stat is greater than 2.58 / 1.96 / 1.64 (significance at 1% / 5% / 10% level).

In the second column, the macro-economic variables were added, and the  $R^2$  was augmented slightly to 0.302. They all had mild coefficients, but the interesting observation was that the FDI inflow into the host country had considerably strong predictive power. Unemployment and Inflation in the host country has negative signs, although not very significant. The signs of these variables were as somewhat similar from that predicted.

In the third column, the demographic variables were injected, with a substantially higher  $R^2$  of 0.481. The coefficient of the stock of international students, measured by the average number of students from a particular country in a particular destination country in the 5 years prior to the year in question, is large and highly significant, confirming the strong persistence through time in bilateral student flows. Due to the high persistency of student flows, past student flows somewhat absorb all the explanatory power of the model. Educational opportunities in the sending country are insignificant, as shown in the cross-section analysis. An interesting observation is that the number of internet users at the host country is highly and positively significant. Perhaps this proves that the number of internet users is a likely proxy for a country's GDP or economic strength and openness.

In specification (4), additional host characteristics related to the quality and reputation are added. Higher government expenditure on Research and Development in the host country has a strong and significant positive effect on the increase of the size of incoming student flows (Expenditure on education had similar but milder effects). Column (4) also includes the university counts in the top 500 of the Shanghai ranking.

This number is not so significant but has positive effect, increasing the number of incoming students.

Column (5) includes the socio-cultural dummy variables. These have highly positive and significant impact on student flows, just as the cross-section data. Colonial ties have the strongest significance, followed by shared border variable. All variables have positive signs. The predictive capability of this model is 25%.

The regression with all variables accounts for 55% of the variance in the dependent variable and the estimated standard deviation of the error term is 1.51. “Adjusted R-squared” makes an adjustment to the plain-old to take account of the number of right hand side variables in the regression and is shown to be 55%.

As additional variables are added to a regression equation,  $R^2$  increases even when the new variables have no real predictive capability. The adjusted- $R^2$  is an  $R^2$ -like measure that avoids this difficulty. When variables are added to the equation, adj- $R^2$  doesn't increase unless the new variables have additional predictive capability. Additional variables with no explanatory capability will increase the Regression SS (and reduce the Residual SS) slightly, except in the unlikely event that the sample partial correlation is *exactly* 0. However, they won't tend to decrease the standard error of the estimate because the reduction in Residual SS will be accompanied by a decrease in Residual DF. If the additional variable has no predictive capability, these two reductions will cancel each other out.

The Final summary statistic which is the “Durbin-Watson,” the classic test statistic for serial correlation, is 2.336. A Durbin-Watson close to 2.0 is consistent with

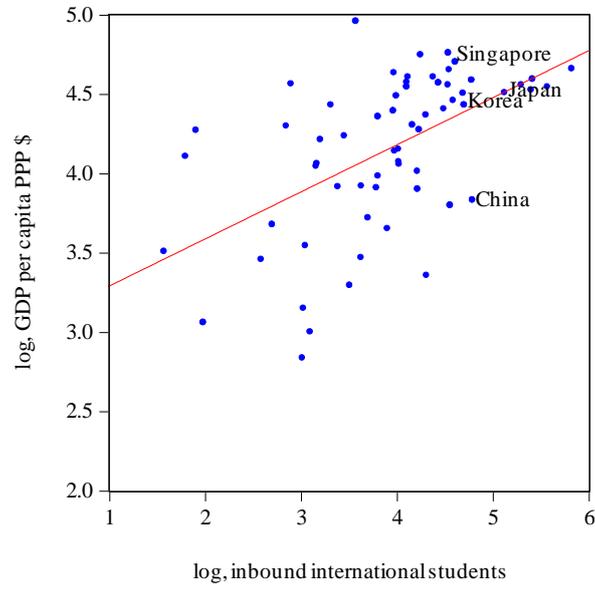
no serial correlation, while a number closer to 0 means there probably is serial correlation.

### 4.3. Regression Analysis for Asian Countries

In this section, Regression results for Asian countries are more closely observed. Initially, the same gravity model explained in detail in chapter 3 was used on a different set of independent variable, flows of students between Asian countries. The dependent variables that were used for worldwide ISM were more or less used for the dataset comprising of Asian countries. However, results showed that the regression for intra-Asian student mobility lacks significance due to the presence of China, which is a massive outlier, and also due to the difficulty of data collecting.

Thus, for this analysis, Asian countries, among other countries in the world were taken in for an examination of trend growth in the flow of students. Scatter diagrams of the logarithm of number of students plotted against a few variables of importance were used. First, the number of international/foreign students in a given country was tested to see whether there exists a correlation between the core variables such as GDP, GERD, GEE (Government Expenditure on Education), which could be the determinants of ISM, and if there is, to what extent. Then the number of students overseas sent from each country was tested with the core independent variables. All of the countries with available data in the UIS were selected, which gave approximately 200 observations. The graphic representations of the correlation between the variables are presented in the figures below.

**Figure 4.1 Correlation between Inbound International student flow and GDP**



**Figure 4.2 Correlation between Inbound International student flow and GERD**

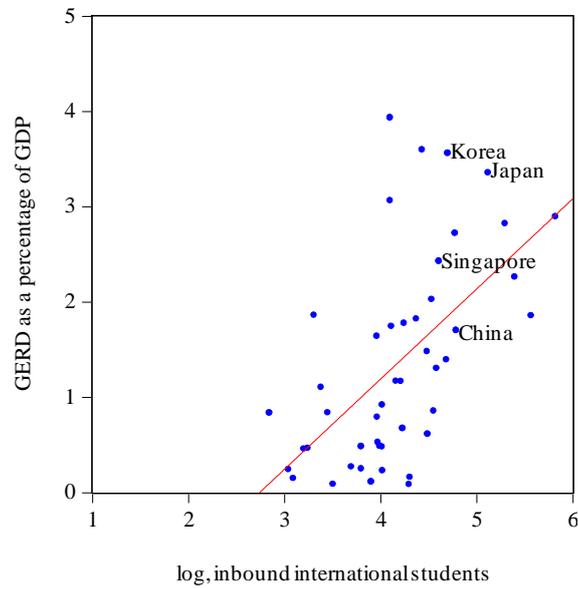


Figure 4.3 Correlation between Inbound International student flow and number of

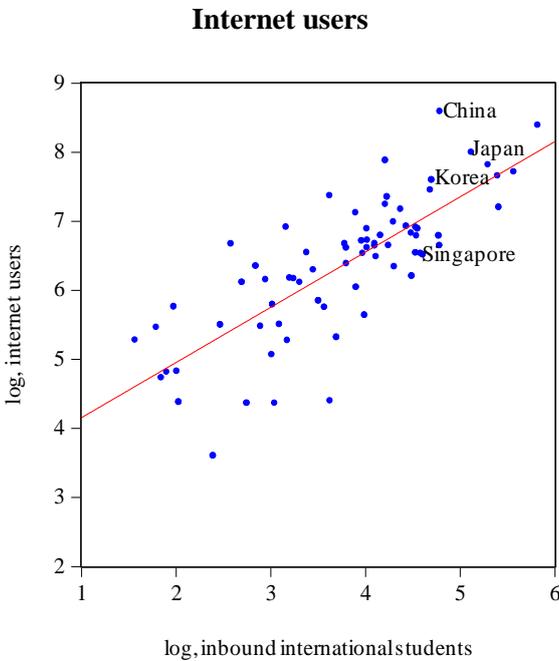
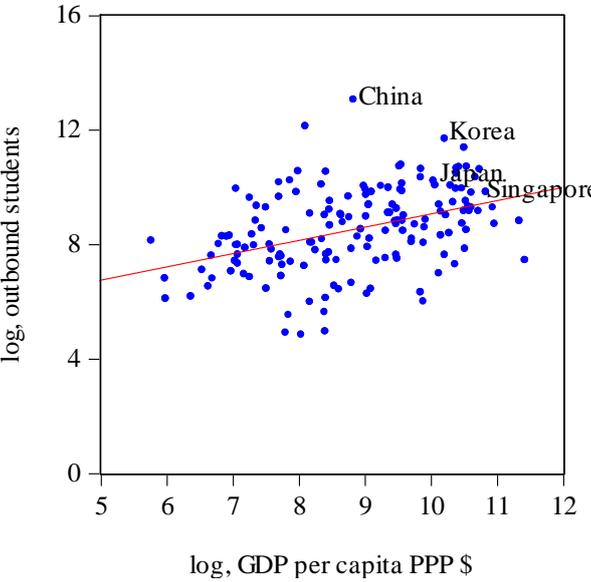


Figure 4.4 Correlation between outbound student flow and GDP



Among the observations of the number of inbound international students in a given country, in terms of GDP, Japan (no. 93) lies more or less on the predicted regression line, which means that it receives as many international students as expected. Korea (no. 150) lies slightly above the regression line meaning it receives less than expected. Singapore (no. 162) lies well above the regression line, receiving fewer students. Other Asian countries such as China (no. 41) lie far below the regression line, receiving more students than the expected level.

The correlation between GERD and the number of inbound international student also shows to have strong correlation. Korea, Japan, and Singapore all lie above the regression line meaning that they receive fewer students than expected, given the amount their governments spend on R&D.

In terms of the number of internet users, China, Japan and Korea are above the regression line, showing that they receive fewer students than they should given the number of internet users in their countries. Singapore lies below the regression fit line.

For the regression analysis using the number of students that are sent from a given country, GDP again shows to have very strong explanatory power. It is shown that China, Japan, Singapore and Korea all lie under the regression line meaning that it sends more students than the expected level. China lies furthest from the regression line and Japan, the closest.

#### 4.4. Limitations of Research

Some of the more serious concern that cast doubt on the robustness and correctness of the empirical results are written out here:

First of all, the limitations of this research have to do with two shortcomings to the type of measurement for the dependent variables data. First, children of immigrants who were born and educated in a country but who nevertheless still retain their parents' foreign nationality, are counted as foreign students, though they are not internationally mobile in the sense that is relevant for the analysis in this paper. This is because students whose nationality differs from that of the country in which they enroll are counted as foreign or international students. These result in an overestimation of the number of internationally mobile foreign students enrolled in a country, particularly for countries with high migration flows (Van Bouwel and Veugelers, 2010).

Second, students who spend a semester or an entire academic year abroad as part of an exchange program, are not counted in this database because they remained enrolled at their home institution while spending time abroad, and is therefore not counted as an internationally mobile foreign student. This results in an underestimation of the number of students that have at least some experience with being internationally mobile. (Van Bouwel and Veugelers, 2010).

However, because the factors that push/pull students by which students decide to enroll in institution overseas can differ according to their period/purpose of stay, maybe it is better for this study to have excluded this source of heterogeneity in the data.

Another data limitation that led to a limitation in the research is the fact that many of the smaller and economically insignificant countries are marked: “Magnitude nil or negligible data” or “data not available”. Thus using the data for years 1999-2009 might not be consistent for all the selected countries. Also, there was an imbalanced representation of the world, since no African countries, and only a few Latin American countries were included in the sample due to lack of data.

Additionally, since ISM is such a multi-faceted phenomenon, this research suffers from the drawbacks of conducting a limited-level analysis, although it has tried to include as many dimensions and variables.

## V. Conclusion and Implications

### 5.1. General Observations

Worldwide Student mobility in higher education, or mobility in academia in general has been going on for as long as civilization began, but it has increasingly become a high profile issue as the numbers of students engaged, the number of countries involved, and the market it creates, have soared unprecedentedly in the last few decades. There is a genuine need for more and better research on the many dimensions of this new phenomena or experience, both in the macro and micro level.

The results from these researches should serve to shed light and give insight in the matter of bringing new students and make the best out of these internationally educated workforces. In this sense, the question of student mobility is not only for universities and higher education affiliates but for governments and the entire nations. In this concluding section, this paper attempts to suggest some implications in this field.

In the macro-level, the study of ISM reveals that there is indeed the “Economy of International Student Migration” that government needs to pay attention to. Already, governments and educational institutions have become increasingly entrepreneurial in their approach to higher education and the development of education 'brands' (Brooks and Waters, 2011). International student mobility is one of the few forms of migration welcome in host countries because students are considered to be an asset for the country, next to high-skilled immigrants. International students are mainly a positive occurrence

because they come, stay for a longer period and leave money behind. In addition, they are young and bring new and innovative ideas (Schwandt, 2010).

As international students have the potential to find jobs in the host country in the long run, the fiscal balance is affected. These students will pay taxes in the host country and by doing so indirectly supports an ageing population in the developed host country. Furthermore, international student migration can contribute to the innovation growth of an economy. In 2006, more than 35 % of Ph.D. scientists and engineers in the US were foreign born (Lucas, 2008). The EU is also aware of this, but has not been able to trigger similar rates so far (Schwandt, 2010).

For all of these reasons, many Western countries have decided to encourage international student migration by offering them attractive conditions they often cannot find in their home countries. Students are motivated to study overseas not only by economic reasons but factors such as opportunities to acquire new language skills, the nature of the country and other leisure or educational elements.

The factors driving student mobility are constantly evolving as many governments focus on colleges and universities as a way to expand their economies and promote social mobility. Gaining better insight into the decision-making processes of students, at both the macro and micro levels, requires understanding both the playing field of international higher education and how prospective students weigh the information they do have to make a decision about where to study (International Student Mobility: Status Report, 2009).

This research is aimed at investigating the determinants of international student mobility, which in other words is to identify the factors which have an impact on the decision that students make to go study overseas. Through this identification, this research then serves to give more information for policy makers and educators in Asian countries, particularly in Korea, in making strategies to gain a competitive edge in accommodating the growing trend of international student mobility and the internationalization of the higher education system.

Implications of this study are in two-folds: first for universities and then for the governments. For the universities, they have to make greater efforts towards the internationalization of their curriculum, student body, faculty, and staff. Although universities were designed as international institutions in their composition from the beginning, they became in the 19th and 20th century de facto national institutions (Schwandt, 2010). However, these days, for universities seek to secure their funding in a globalised economy, they have to attract more foreign students. This can be done by better attending to the foreign students' needs. Many students choose to study overseas, in hopes of enhancing their employment chances by acquiring qualifications with a difference.

It may be the universities' job to develop helpful curricula and majors that will equip the students for their desired careers, but the government has to really step up in this area and work with the universities and facilitate the mobility of students, who have high potentials of becoming skilled workers. They should enact better laws, ease

regulations, and take the right steps to create a better environment for a regional labor market.

## 5.2. Policy Implications and Strategies for Korea

South Korea, as discussed in Chapter 4, is a special case study in the field of ISM. Ever since the beginning of history, its imbalance between the number of students it sends and the one it receives, as well as between its related expenses and profits, is gigantic and has continued to rise. According to Statistics Korea, in year 2010, Korea sent out 404,739 students in the tertiary level but only received 143,842. Whereas its expense was \$ 4,483.50 million dollars, its income was \$ 37.1 million, creating a balance of \$-4,446.40.

The implications of this study for South Korea are both as host and home country. For professionals in the field of international education, attention should be paid to the variables that have been found significant, such as internet users, and policy directions and recruitment strategies should be built around them. They should rely on concrete empirical evidence as much as they on hearsays. Unfortunately, many of the potential determinants of student flows are non-quantifiable and immeasurable such as the visa policy, financial support, and the effects of Hallyu in the Korean case.

In the study of ISM, employment opportunities have been found to be significant factors that draw students. If applied in the reverse sense, poor employment opportunities push away students (Unemployment at host country is negatively correlated to incoming student flows). In this sense, more educational programs and degrees should directly connect into job opportunities for foreign students. More universities should partner with

enterprises for Industry-Academic cooperation whereby student internship opportunities can be provided. Universities should also particularly focus on educating the foreign students on the local market culture and language skills.

There have already been calls for vocational schools and programs to attract foreign students, which may even be expected to unleash a new Korean Wave of sorts. The reality is that many vocational schools teaching professional skills in other parts of the world are of lower quality, more expensive, and less accessible than the ones in Korea.

However, the problem is that in any country, the top priority for vocational school students is employment. Korean vocational schools should hire as faculty professionals working in the field. Since many professional techniques that vocational schools teach are changing rapidly, only professionals in active service are able to teach the latest skills (Shim, 2011). Also, as “lecturers”, these faculty members can observe talented students during classes, and lead them straight to employment opportunities after graduation. The school also should stay close in contact with potential employers to learn about job information, and also encourage student to engage in social networking services with the school’s alumni.

With solid curriculum and employment opportunities, schools will not even have to do much to advertise itself to recruit students, except at the beginning, because its reputation will naturally be built by students and graduates who promote it by word of mouth and other online resources such as Websites, Social Network Systems such as Twitter, Facebook and YouTube.

Korean Trade Technical Colleges have enough competitive advantage in teaching certain skills such as: auto repair, home building, cooking and beauty skills. There are currently 520 vocational schools in Korea and they should be allowed to teach foreign students as soon as possible. However, the Ministry of Employment and Labor is lukewarm about the matter, because it worries about a possible surge of illegal aliens (Shim, 2011). What the government is overlooking is the fact that many young Koreans do not want to enroll in vocational schools to avoid the kind of jobs they will end up with and thus vocational schools are having a hard time attracting students. It could be beneficial for the economy to host foreign students as an alternative. Plus, many of the foreign students, usually from developing countries, return to their home countries to make a better use of their knowledge in using Korea's advanced technology. Just as famous French culinary schools and hotel management schools in Switzerland are and have been magnets for Korean students, Korean vocational schools can attract foreign students.

A "timely" surge of vocational programs in Korean universities is taking place. Creative programs are being built around niche market opportunities or areas where Korea has competitive advantage, such as: coffee barista, deli, bakery, IT Technology, "Smart-phones" contents management, server infrastructure, SW/HW testing, Cosmetics, Mechanical, etc (Choi, 2011). These programs offer the needed certification and knowledge for the creation of small-capital venture companies. They also operate in the form of "Cyber schools" offering online classes (Joo, 2010). Many of these schools

already have lecturers and educational facilities that are capable of accommodating foreign students.

In addition to vocational schools with potentials for success, South Korea benefits from its location close to enormous markets. A huge, and increasing, number of international students come from other East Asian countries, including China.

Furthermore, it also has the advantage of having been highly focused on education as a tool of economic development, which is in part how the country propelled itself in just one generation from the ranks of the world's poorest nations to among the world's richest. South Korea boasts of its highly educated citizens. It scored highest on the PISA exams in 2010 making it one of the top study destinations worldwide (International Student Mobility: Status Report, 2009).

Taken together, though South Korea may have high outbound mobility, developing its higher education to a large industry seems totally feasible. And this will be stepped up by education and migration policies facilitating the growth in student migration population, which are being undertaken throughout the Asian region. As other countries in East and Southeast Asia have done in an attempt to increase the stock of foreign students, the liberalization of student visa procedures, reduction of tuition fees and other costs associated with overseas stay, provision of scholarships and education loans, opening of English-taught programs, and permission for part-time work while studying including dependents in some countries, etc. would certainly help. The current and targeted enrolments of international students have kept on rising in Asia, making a stronger presence within the international education industry. (Rahman, 2011)

Moreover, in order for Korea to not only develop into a destination for ISM but also continue to thrive as a sending nation and benefit from foreign education, the job market at home should be better structured to accommodate returning students, to acknowledge and place due value on foreign degrees, even the ones other than from the US.

## References

- Agarwal, V. B. and Winkler, D. R. (1985). 'Foreign Demand for United States Higher Education: A Study of Developing Countries in the Eastern Hemisphere', *Economic Development and Cultural Change*, vol.33, pp.623-644
- Aphijanyatham, R. (2010) no 25 East Asian Internationalisation of Higher Education A Key to Regional Integration. *SEAMEO Regional Centre for Higher Education and Development, Center for Research on International Cooperation in Education Development, University of Tsukuba*
- Ashby, N. J. (2007). Economic freedom and migration flows between US states. *Southern Economic Journal*, 73(3), 677-697.
- Becker, G. (1964). Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. New York: *Columbia University Press (for National Bureau of Economic Research)*.
- Bessey, D. (2007). 'International Student Migration to Germany', *Swiss Leading House working paper* no.6
- Brewer, Dominic J., Eric R. Eide and Ronald Ehrenberg, (1999), Does It Pay to Attend and Elite Private College? Cross-cohort Evidence on the Effects of College Type on Earnings, *The Journal of Human Resources*, vol.34, no.1, pp.104-123.27
- Brooks, J. and Waters, R. (2011). Student Mobilities, Migration and the Internationalization of Higher Education. Palgrave Macmillan .
- Byram, F. and Dervin, M. (2008). Students, Staff and Academic Mobility in Higher Education. *Cambridge Scholars Publishing* 15 Angerton Gardens, Newcastle, NE5 2JA, UK.
- Canning, D. (1999). Internet Use and Telecommunications Infrastructure. Consulting Assistance on Economic Reform. *II CAER II Discussion Paper* 54. [http://pdf.usaid.gov/pdf\\_docs/Pnach811.pdf](http://pdf.usaid.gov/pdf_docs/Pnach811.pdf)
- César, Prado and Yepes. (2006;2007). Regionalization of higher education services in Europe and East Asia and potential for global change. *Asia Europe Journal*, 83-92.
- Chellaraj, G., Maskus, K. E. and Mattoo, A. (2005). The Contribution of Skilled Immigration and International Graduate Students to U.S. Innovation, *World Bank Policy Research Working Paper* 3588
- Chen, T.-M., Barnett, G.A. (2000). Research on international student flows from a macro perspective: A network analysis of 1985, 1989 and 1995. *Higher Education*, 39, 435-453.
- Choi, C. (2003). Does the Internet stimulate inward foreign direct investment? *Journal of Policy Modeling* 25 (2003) 319-326. [disk.mju.ac.kr/WebLink/ckchoi/internet\\_JPM.pdf](http://disk.mju.ac.kr/WebLink/ckchoi/internet_JPM.pdf)
- Choi, H. (2011 년 02 월 23 일). [캠퍼스]이색학과, 개성도 만점•전문성도 만점. *Asia Today*, <http://www.asiatoday.co.kr/news/view.asp?seq=452239>.
- Cieslak, E. (1955) The Foreign student in American colleges: A survey and evaluation of administrative problems and practices. Wayne University Press.

- Cummings, W. K. (1984). 'Going Overseas for Higher Education: The Asian Experience', *Comparative Education Review*, vol.28, pp.241-257
- Cummings, K.,William. (1984). Going Overseas for Higher Education: The Asian Experience. *Comparative Education Review*, vol.28, no.2, pp.241-257.
- Epple, D., Romano, R. and Sieg, H. (2006). 'Admission, Tuition and Financial Aid Policies in the Market for Higher Education', *Econometrica*, vol.74
- Frankel, J., & Rose, A. (2002). An estimate of the effects of common currencies on trade and income. *Quarterly Journal of Economics*, 117(2), 437-466.
- Freeman, R. (1986). Demand for Education, in Ashenfelter, O. and Layard, R. (ed.), *Handbook of Labor Economics*, vol.1, Elsevier, the Netherlands
- Freund, C., & Weinhold, D. (2000). On the effect of the Internet on International trade. *International Finance Discussion Papers*. Board of Governors of the Federal Reserve System.
- Gaulier, G., Mayer, T. and Zignago, S. (2003), Notes on CEPII's distances measures, Paris. [www.cepii.fr](http://www.cepii.fr).
- Haug, A. (1996). Tests for cointegration a Monte Carlo comparison, *Journal of Econometrics*, Elsevier, vol. 71(1-2), pages 89-115.
- Hennart, J.F., & Park, Y.R. (1994). Location, governance, and strategic, determinants of Japanese manufacturing investment in the United States. *Strategic Management Journal*, 15(6): 419-436.
- Hoxby, C. (1997). The Changing Market Structure of U.S. Higher Education, *Harvard University mimeo*
- Huh, H., Kim, M. and Lee, H. (2003). The Role of Linguistic and Ethnic Ties in International Travel: An Application of the Gravity Model, *METU International Conference in Economics VII*, Ankara, Turkey, September 6-9.
- International Migration Report (2002) United Nations. Department of Economic and Social Affairs. Population Division. United Nations Publication. New York
- International standard classification of education. (1997). UNESCO:  
<http://www.slideshare.net/nfraga/isced>
- Joo, J. (2010 년 12 월 17 일). [2011 사이버대학] 이색학과 신설...미래형 대학 '우뚝'. *Asia Today*, <http://www.asiatoday.co.kr/news/view.asp?seq=428498>.
- Karemera, D, Iwuagwu Oguledo, V., and Davis, B. (2000) A Gravity Model Analysis of International Migration to North America, *Applied Economics*, 32, pp. 1745-1755.
- Kell P.M. & Vogl, G. (Guest Editors) (2008). Perspectives on mobility, migration and the well-being of international students. *International Journal of Asia Pacific Studies (IJAPS)* 4,1:v-xviii.
- Kell, P.M. & Vogl, G. (2008). Transnational Education: The politics of mobility, migration and the well-being of international students. *International Journal of Asia Pacific studies (IJAPS)*4, 1:21-31.
- Knight, J. (2004). Internationalization remodeled: Definition, Approaches, and Rationales. *Journal of Studies in International Education*, 8(1): 5-31.
- Lasanowski, V. (2009). Student mobility unlocked: What makes some countries more attractive places to study. *International Student Mobility: Status Report 2009, The*

- Organisation for Economic Cooperation and Development (OECD)*,  
[http://www.obhe.ac.uk/newsletters/unlocking\\_student\\_mobility](http://www.obhe.ac.uk/newsletters/unlocking_student_mobility) .
- Lee, K. H. and Tan, J. Peng (1984). The International Flow of Third Level Lesser Developed Country Students to Developed Countries: Determinants and Implications, *Higher Education*, vol.13, pp.687-707
- Li, M., & Bray, M. (2007). Cross-border flows of students for higher education: Push-pull factors and motivations of mainland Chinese students in Hing Kong and Macau. *Higher Education*, 53, 791-818.
- Liu, D., & Wang, J. (2008). The determinants of international student mobility: An empirical study on US data. Ho"gskolan Dalarna: Master Thesis.
- Lucas, E. B. Robert. (2008). Trade, Equity, and Development Program. *International Labor Migration in a Globalizing Economy, Carnegie Paper*.
- Marklein, B. and Marklein, M. (December 8, 2009 ). Chinese college students flocking to U.S. campuses. "USA TODAY ", [http://www.usatoday.com/news/education/2009-12-08\\_1Achinesestudents08\\_CV\\_N.htm?csp=usat.me](http://www.usatoday.com/news/education/2009-12-08_1Achinesestudents08_CV_N.htm?csp=usat.me) .
- Mayda, A. M. (2005). International migration: a panel data analysis of economic and non-economic determinants, *IZA Discussion Paper*, No. 1590, May
- Mazzarol, T, & Soutar, G. (2002). 'Push-pull' factors influencing international students' destination choice. *The International Journal of Educational Management* 16 (2), 82-90
- McMahon, M. (1992). Higher Education in a World Market: A Historical Look at the Global Context of International Study. *Higher Education*, 24 (2), 465-82.
- Naidoo, V. (2007). Research on the flow of international students to UK universities: Determinants and implications. *Journal of Research in International Education*, 6(3), 287-307.
- Peri, G. (2005). International Migrations: some comparisons and lessons for the European Union. Davis: University of California, mimeo.
- Project Atlas. (2011). Student mobility and the internationalization of Higher Education, National Policies and Strategies from Six World Regions. *A Project Atlas Report*.
- Sen, A. and Smith, T.E. (1995). Gravity Models of Spatial Interaction Behavior, New York: Springer.
- Sethi, D. Guisinger, S. E., Phelan, S. E., Berg, D. M. (2003). Trends in Foreign Direct Investment Flows: A Theoretical and Empirical Analysis. *Journal of International Business Studies*, 34 (4), s. 315-326.
- Shenoy A. (2002) International Students - . The Global Commerce Of Higher Education. *Encyclopedia of Education. Latin Trade*.
- Shim, S. (2011, 8, 5). [Viewpoint] A path for vocational schools It's time for Korea to attract foreigners to our vocational schools. It may unleash a new Korean Wave of sorts - a Korean Wave of vocational skills. JoongAng Ilbo.
- Sugimura, M. (2009) Higher Education Strategies and International Student Flows in Asian Countries GIARI Working Paper Vol.2008-E-18. Waseda University Global COE Program. Global Institute for Asian Regional Integration
- Tay, C. (2009) Determinants Of The Flow Of International Students In Higher Education. *International Higher Education*.

- <http://christinatay111.blogspot.com/2009/03/determinants-of-flow-of-international.html>
- Terpstra, V., & Yu, C.M. (1988). Determinants of foreign investment of U.S. advertising agencies. *Journal of International Business Studies*, 19(1): 33-46.
- Thissen, L. and Ederveen, S. (2006). Higher education: Time for coordination on a European level?. *CPB discussion paper*
- Tremblay, K. (2002). Student Mobility Between and Towards OECD Countries in 2001: A Comparative Analysis. *International Mobility of the Highly Skilled, OECD*, pp.39-67
- Tremblay, K. (2002), Student Mobility Between and Towards OECD Countries in 2001: A Comparative Analysis, OECD, Paris
- “Unesco Institute Of Higher Education, Shanghai Jiao Tong University.” (2004). Academic Ranking of World Universities: <<http://ed.sjtu.edu.cn/ranking.htm>>.
- UNESCO-UIS-OECD-Eurostat (2004). UOE data collection manual. Data Collection on Education Systems
- Van Bouwel, L. and Veugelers, R. (2010). Does university quality drive international student flows?, *CEPR Discussion Papers 7657*, C.E.P.R. Discussion Papers.
- WES. (2008). International student mobility: patterns and trends. *World Migration*.
- Yu, C.J., & Ito, K. (1988). Oligopolistic reaction and foreign direct investment: The case of the U.S. tire and textiles industries. *Journal of International Business Studies*. 19(3): 449-460.
- Zipf, G. K. (1946,1949).The PP/D hypothesis: on the intercity movement of persons. *American Sociological Review* 11: 677-686.
- 이현훈 (2006). 우리나라의 해외교민이 외국과의 무역 및 인적교류에 미치는 영향분석-중력모형의 이용. *한국경제연구, 제16권 <학진등재지>*
- 이현훈 (2004). 중력모형을 이용한 상품 및 사람의 국가간 이동에 대한 결정요인 분석. *성곡논총, 제35집*, pp.345-394.
- 정미향 (1992). 중력모형을 이용한 한국인의 해외여행 수요분석. *서울 세종대학교 iii, 56 장 학위논문(석사) 세종대학교 대학원 관광경영학과*

## 국문초록

국가간 유학생 이동의 상승 추세는 기록적인 수준에 도달하였으며 이것은 이 분야 연구의 중요성을 부각시킨다. 본 논문은 전체 국가간 유학생 이동성 주요 동향을 살펴보며 유학생 이동 흐름을 결정하는 요인에 대한 이론적 가정을 하였다. 본 논문의 주된 목적은 계량경제 회귀 분석의 방법으로 전 세계 국가간 고등 교육 수준의 학생들의 흐름에 영향을 미치는 실증적 요인을 조사하는 것이다. 이차적 목적은 국제 학생 이동성 및 고등 교육의 국제화 추진을 위해 유학생 파견과 해외 유학생 유치 관련 정책 수립 방향을 위한 연구자료 제공이다. 계량 경제 방법을 사용하여 학생이동의 실증적 연구를 담은 이전 논문들은 전반적으로 개발 도상국에서 선진국으로의, 단일 국가의 (일반적으로 미국), 또는 특정 국가 조합의 유학생의 흐름에 초점을 두거나 집중되어 있다. 이 사실을 고려해 이 논문은 유학생 파견국가 및 유학생 유치국가로서 50개국 (선진국과 개발도상국 차별 없이)을 다루어 전세계적 수준의 국가간 학생 이동을 연구함으로써 기존 문헌을 보완한다. 1999년부터 2009년까지의 시계열 분석과 횡단면 분석 데이터를 사용하여 고등 교육 단계의 유학생 흐름을 결정하는 요인을 분석하기 위해 중력 모델이 사용 되었다. 50 개국 각 국가간의 유학생 수가 종속 변수로 설정되었다. 일인당 국민소득, 실업률과 인플레이션률 (시장 규모 및 안정을 반영), 세계적 랭킹에 드는 국내 고등 교육 기관의 수, 정부 연구개발비 (교육의 품질 반영) 등 경제적 및 비경제적, 거시적 및 미시적, 전통적 및 혁신적 독립변수들의 조합들이 실험되었다. 또한 국가간 물리적, 문화적

거리도 식에 반영되었다. 공통된 국경, 공통 언어, 과거의 식민지 관계 등의 더미 변수도 유학생 흐름에 중요한 영향을 미치는지 연구되었다. 이중 여러 독립 변수들이 국가간 유학생의 흐름에 큰 영향을 미치는 것으로 밝혀졌다. 본 논문은 분석 결과에 따른 국가간 유학생 이동 및 고등 교육에 대한 논의로 마무리한다.

**주요어:** 국가간 학생 이동, 국제화, 고등 교육, 국제 경영, 중력 모형

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