MULTI-DIMENSIONAL ANALYSIS OF INTERNATIONALLY MOBILE STUDENTS IN HIGHER EDUCATION WITH PUSH AND PULL FACTORS

by

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(Under the Direction of Robert K. Toutkoushian)

ABSTRACT

This study investigates a major form of internationalization of higher education, international student mobility (ISM) in over 200 countries between 1999 and 2017. Various theoretical explanations of the phenomenon are provided, followed by descriptive explanations of ISM patterns and empirical analysis on push and pull factors. From descriptive and structural perspectives, traditionally strong inflow countries have remained at the top, even with more diversified source countries. Peripheral countries with low economic development remained inactive players in the international college student market, while a group of semi-peripheral countries have emerged as strong actors in the global higher education market. At the regional level, even with various regional initiatives to integrate and harmonize the higher education system, there has been limited success with regional imbalance. At the country level, this study found that certain economic, education, demographic, and global level engagement indicators are associated with the volume of international flows. According to the results from panel data analysis, key economic factors, GDP in pull models, and GNI per capita in push models were found to be statistically significant and positively associated with the volume of international students. Network effects and favorable immigration policies were also positively related to the

volume of international student inflows. There were some differences between developing and developed nations. In pull models for developed nations, the cost factor was important, while higher education quality and capacity were more important for developing nations. Future studies should reflect diverse perspectives on ISM so that the complexity of the phenomenon can be better analyzed. To better explain the multifaceted nature of international student migration, collaborative research efforts across different academic disciplines are recommended.

INDEX WORDS: International Higher Education, International Student Mobility, International Student Migration Theories, Push and Pull Factors, Panel Data Analysis

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CHAPTER 1

INTRODUCTION

Internationalization has been an important theme in higher education since the 1990s, and a growing number of institutions are adding more international elements into their service. Knight (1993) defined the internationalization of higher education as "the process of integrating an international and intercultural dimension into the teaching, research, and service functions of the institution" (p. 21). The most common form of internationalization is through overseas flows of people, such as students, scholars, and academic staff, either short-term or long-term. Higher education institutions themselves also move across borders physically or virtually; foreign branch campuses and franchises are good examples of the physical movement of higher education services, while cyber campuses and online learning targeting foreign students represent institutions' internationalization efforts in virtual spaces. In this way, higher education has been internationalized mainly through the mobility of people or educational services.

Even without virtual and physical flows, international elements have influenced domestic college campuses through teaching, research, and student activities. Institutions encourage students to participate in on-campus international activities, and some issue global ambassador certificates that fulfill the requirements for these activities and experiences. Another indicator of this internationalization is that completing a certain number of foreign language classes has become a graduation requirement on many campuses. Many higher education institutions

designate an organizational unit solely for international education, study abroad, foreign students, and/or immigration issues. Students have become exposed to various opportunities for international higher education on-campus. Knight (2012) described these kinds of on-campus international elements as "at-home internationalization."

Although not all aspects of internationalization can be measured quantitatively, a number of indicators demonstrate the growth of international dimensions in higher education. First, the number of college students seeking foreign degrees globally has increased from 2 million in 2000 to over 5 million in 2017 (UNESCO Institute for Statistics [UIS] statistics). Second, the number of international branch campuses grew from less than 50 in the 1990s to over 250 in 2015 (WES). Third, the proportion of international scientific collaborations in all publications increased from 13% in 2000 to a little under 20% in 2013 (NSF, Nature).

There are other observable internationalization efforts in many countries. Countries in the Middle East and Asia have designated education hubs (e.g., Kuala Lumpur Education City in Malaysia, Singapore's Global School House, Knowledge Village and International Academic City in Dubai, Qatar's Education City, etc.), expecting them to serve national development as well as attract foreign institutions, students, and investment (Knight, 2018). There are growing numbers of international partnerships between institutions and international agencies connecting different countries, although data on these are not systematically collected and reported across countries.

The rapid growth of the international dimension of higher education can be both natural and strategically planned. The natural growth of international students who pursue overseas education can be explained by the increasing demand for higher education in general and study abroad, and the impact of globalization and technology development. With nations more

interconnected through globalization, people perceive other nations as less distant than in the past. Also, as a result of the internet and media, people have become more aware of overseas education opportunities, and access to information from various sources helps them compare and calculate the benefits and costs of study abroad.

The demand for workers who have global knowledge and foreign language skills has increased with the growth in the exchange of goods and services between countries. The escalating value of international training on the labor market and the insufficient supply of quality domestic higher education opportunities, along with a failure to keep up with the growing number of college students, has led to a growing demand for international higher education. Students pursue study abroad experiences to position them better in the labor market through acquired social, cultural, and human capital (Findlay, 2011). Moreover, with the economic development and growth of middle-income families, more households can bear the cost of studying abroad and are willing to invest their disposable income in educational opportunities.

Natural growth is also linked to the development of technology, which has reduced the cost of transportation and facilitated information sharing and access to education opportunities abroad. More students are aware of these opportunities, and are able to gather information easily through various sources and compare options. In this way, barriers to international higher education have been lowered.

It is also possible that supply factors have contributed to the growth of international higher education (Findlay, 2011). This is strategically planned growth, mainly driven by national and institutional initiatives that expect positive benefits from it. International college students are often considered to be a potential pool of skilled migrants who can bring economic benefits to the destination country, and studies have shown that international student mobility (ISM) is one

of the major sources of highly skilled migrants in the United States, the United Kingdom, and Australia (Hawthorne, 2008; Kahanec & Králiková, 2011a; Ritzen & Marconi, 2011; Ziguras & Law, 2006).

An empirical study by Felbermayr and Reczkowski (2012), which covered 23 host countries and 150 origin countries between 1970 and 2000, found that a 10% increase in international students would lead to a 0.9% increase in highly skilled migrants. The benefits to the host country are even greater for advanced degree-level students who can contribute to the economy through innovation, research, and various forms of knowledge products. Also, some countries have utilized international student exchanges as a diplomatic tool for leveraging soft power (Byrne, 2016; Gao & Liu, 2020; Lomer et al., 2018; Nye, 2004; Paradise, 2012). All this has led to fierce competition for global talent between countries, and resulted in strategic plans and policies to attract them.

Not only the positive economic benefits for the destination countries listed above, but also the short-term financial benefits to higher education institutions explain why the strategic recruitment of international students has grown. For higher education institutions suffering from financial problems, partially due to reduced government contributions and declining college-age populations, international students who are willing to pay full tuition and fees, sometimes at even higher rates than domestic students, are considered an attractive revenue source. Some institutions have developed and implemented marketing and promotion strategies themselves or with other agencies. Higher education institutions engage in more business- and commercial-like activities to recruit international students (Knight, 2012). In summary, it is possible that demand- and supply side factors have contributed to the growth of international higher education.

As higher education has become more internationalized, the volume of studies on international higher education has also increased, covering various topics. It reflects a wide range of related issues and the far-reaching impact of international higher education. This study focuses on ISM, the most conventional form of education internalization. Studying international college students is crucial, as they serve multiple roles, such as revenue generation for institutions, added value in diverse student bodies for colleges, network building between institutions and countries as returnees, and highly skilled migrants in the labor market. In light of the growing importance of attracting global talent, a number of studies on ISM have already been conducted.

Even with a large number of studies, our current understanding of ISM is not comprehensive. Many studies on ISM have simplified the phenomenon and failed to address its complexities. For instance, ISM is composed of multiple actors in multi-layered networks, and interactions between actors at different levels, accumulated relationships through history, and environmental changes at different times shape it. It cannot be easily explained by a single theory in a particular academic field; rather, interdisciplinary knowledge can uncover multidimensional aspects of the phenomenon.

Scholars from different fields, such as education, economics, and geography, have explained the multifaceted aspects of ISM from their own, restricted approaches, and there has been little effort to integrate them in a research study. In addition, for analytic studies applying quantitative methods, the coverage of nation-states is rather limited to the Organisation for Economic Co-operation and Development (OECD), Europe or a few richer countries. Even though OECD countries account for the majority of inbound volume, excluding other countries creates a risk of bias (Kaushal & Lanati, 2019).

To fill this gap, this study aimed to provide more comprehensive insights into international student flows using relevant theories and recent data. This study collected ISM data for 200 nations between 1999 and 2017. A wider coverage of nations can capture what has been missed in previous studies and will add value to the cumulative knowledge of international student migration. With more recent data, this study aims to update previous findings.

This study analyzes ISM from interdisciplinary perspectives. Student migration is a phenomenon associated with multidisciplinary fields, and this study applies knowledge from different fields, such as geography, international relations, economics, sociology, and higher education, to explain the migration phenomenon. In this way, analytic insights can reflect the complexities of ISM in the real world. A multidimensional approach enables the use of this study for various stakeholders, not limited to the higher education sector. This study contributes to the existing knowledge on ISM through an explanation of the phenomenon from an interdisciplinary perspective and updates previous findings with more time/country coverage and recent data.

This study aims to answer three research questions.

1) How has international student mobility changed over time, and are there any distinct trends at the world, region, and country levels?

2) Are changes in international student flows associated with selected push and pull factors?

3) Are there any differences between developed and developing nations in terms of push and pull factors?

To answer these research questions, previous studies on ISM, including relevant theories, were reviewed first. Next, overall mobility patterns were explained with descriptive summaries and graphs. Then, panel data analysis with fixed effects was conducted to empirically test the relationships between international student flows and key push/pull factors. For analysis,

indicators on the national capacity of higher education, socioeconomic environments, immigration policies, international migration, and other data were obtained from various websites such as UNESCO, World Bank, OECD, Global rankings on higher education, and more.

In the next chapter, previous studies on ISM and related theories are introduced. Chapter 3 covers the data and methods applied in this study, and the analysis and discussion of findings are addressed in Chapter 4. Chapter 5 presents limitations and implications for policy makers and enrollment managers in different institutions, as well as other stakeholders in international higher education.

CHAPTER 2

LIETERATURE REVIEWS AND THEORETICAL FRAMEWORK

This chapter outlines previous research studies on international student mobility and the theoretical framework, which is mostly borrowed from migration theories. The first section covers studies on international student mobility in general, followed by underpinning theories, history, and determinants of ISM. Although many studies have shed light on different aspects of ISM, little effort has been made to construct a structured theory that distinguishes it from other migration phenomena. A discussion on which theories are often applied to ISM and how migration theories explain the phenomenon follows. These theories also indicate that different factors influence the trends and volumes of international student flows. Combining theoretical explanations and other studies, the determinants of ISM are discussed.

Theorizing International Student Mobility

Of the numerous studies on ISM, only a few scholars, such as Rizvi (2011) and Riano and Piguet (2016), put effort into integrating and addressing relevant theories in one study. Most theories underpinning previous ISM studies are based on concepts and explanations in human migration studies. As ISM is considered a special form of international migration, it is natural to explain it using migration theories, with some modifications. Many of these international students have intentions to settle in the destination country as temporary or permanent migrants after completing their degrees, which indicates a close connection to international migration

(DIMA, 2006; Gribble, 2008; Lowell et al., 2004; Vertovec, 2002). In this section, major theories applied in ISM studies and theorizing efforts in different academic disciplines are briefly introduced.

International migration has mainly been described from neoclassical theory, which explains the movement of people with economic factors. At the macro level, geographical differences in the ratio of labor supply and demand can lead to differentials in wages, and people migrate from labor-intensive, low-wage to high-wage, capital-rich countries (Massey et al., 1993). At the micro level, neoclassical theories consider individual migrants to be rational actors who calculate the costs and benefits and decide to migrate if their predicted benefits outweigh the costs of migration (Haas, 2011). As rational actors, individuals compare a set of alternative choices given their financial and regulatory constraints and choose the option that maximizes their utility, which is termed "utility maximization theory" (Borjas, 1989).

An individual's rational choice in education is generally framed in human capital theory. According to this theory, people invest their resources in education, expecting greater future earnings and employment (Becker, 1964). The educational investment in human capital theory can also be applied in international education decisions. Individuals decide whether to study abroad and where, evaluating countries and institutions after calculating their predicted return on investment. The returns generally include labor market benefits, but also other non-monetary factors. Labor market benefits from studying abroad are skills and credentials from educational training in foreign countries that are expected to improve students' employability in the labor market compared to pursuing degrees in their home countries (Kaushal & Lanati, 2019).

The International Organization for Migration (IOM) describes an individual's decision to study abroad as highly rationalized calculations, taking into account monetary and non-monetary

costs and benefits (IOM, 2008). If the benefits of studying abroad outweigh the costs, and the net benefit is greater, people are more likely to decide to study abroad. Micro-level neoclassical theory, an individual's rational choice based on utility maximization, and human capital theory have often been applied together to explain how international students decide to study abroad. For instance, Beine (2012) modeled international students' destination choices by comparing the utility of studying abroad in a possible set of countries to their origin country. Petzold and Moog (2017) also framed their work with the theory of rational choice and conducted an experimental survey to investigate how perceived benefits, resources, and restrictions affected students' educational decision making.

Push and pull theory grouped the factors in neoclassical theory into origin- and destination-specific variables, which became common concepts applied in migration studies. Push factors are unfavorable conditions in an origin country that push people to leave or migrate, while pull factors are destination-specific conditions that attract people to choose a particular place over others (O'Reilly, 2012). Examples of push factors are limited economic opportunities, poor working conditions, political instability, and oppression, while pull factors include higher living standards and a better labor market environment with better job opportunities (De Haas et al., 2018; Mayda, 2010; O'Reilly, 2019).

Much of the ISM literature has also applied the push and pull theory in their empirical studies (Bodycott, 2009; Chen, 2017; Lee, 2014). McMahon (1992) tested the macro-level push model for outflows of third-world nations and the pull model for inflows to the United States separately to examine how national characteristics (e.g., economic, political, and educational factors) promoted or deterred international flows. Mazzarol and Soutar (2002) conducted surveys and focus group interviews with students from four Asian countries to investigate which factors

affected students' decisions to study abroad. According to this study, international students go through three distinct stages when deciding where to study: 1) the decision to study abroad, 2) the choice of destination country, and 3) the choice of institution, and identified push-pull factors for each stage (Mazzarol & Soutar, 2002).

Similarly, Eder et al. (2010) applied qualitative analysis to investigate push and pull factors that constrained or motivated foreign students' destination choices. Compared to labor migration studies, with their focus on economic factors, recent ISM studies tend to emphasize educational factors, such as demand and supply of quality higher education and other policy factors.

The main criticism of the micro-level neoclassical view is that it places too much weight on an individual's free will and focuses on economic factors (Haas, 2010). Also, the neoclassical view disregards structural and historical factors (Castles, 2010). The new economics of labor migration theory refined the neoclassical theory and explained individuals' migration decisions as a result of household strategies for their economic well-being (Stark & Bloom, 1985). This implies that decisions are not made by individual actors, but collectively at the household level (Massey et al., 1993; Stark & Taylor, 1986). Water and Brook (2012) pointed out limitations of many educational migration studies with heavy weight on individual-centered decisions and emphasized the need to extend the analytic scope to families and their social ties, as decisions are often influenced and framed by those relational connections.

Compared to the group of theories focusing on individuals' decision-making processes and household strategies, world systems theory, or more broadly, critical theories, explain international migration at the system level with a historical and structural approach. They address the stable structure of the world system over time, which has been reinforced and maintained by

uneven economic development and the distribution of resources. Among them, world systems theory classifies countries into three strata: core, semi-periphery, and periphery, depending on their roles in international division of labor (Wallerstein, 1974, 1979, 1984). According to this theory, positions of nation-states in the world system are unlikely to change over time, as the core will have the power and resources to maintain the system; hence, the overall core-periphery structure is stable (Wallerstein, 1974, 1979, 1984). These capitalist economic relations are mirrored in many forms of international flows in political, economic, and cultural domains, mostly in international trade, but also in international migration as a "by-product of global capitalism" (O'Reilly, 2019, p. 33).

International student migration studies with world systems theory contend that hierarchical orders of nation-states in the international political economy are reflected in academic hegemony and relations between nation-states in international knowledge networks, including ISM. They argue that the unequal distribution of power and resources in the global higher education market disadvantages periphery nations. A lack of academic capability, resources, and technological skills in periphery countries leads to the loss of students to core countries, the so-called "brain-drain," while core nations benefit from "brain-gain" with their resources and positional power, which intensifies the centralized and polarized structure (Chen & Barnett 2000; Weiler 1984).

With network analysis becoming a popular tool to examine structural dimensions of relational flows, many scholars have applied this method to check whether global flows between nation-states show any distinct structural patterns and whether they are aligned with any structural theory, including the world system. This is also the case for international student flows. A number of studies have shown that patterns of international student flows from the

1980s to the 2010s can be explained by the world systems theory in that the overall core-periphery relationship has been stable and the network has become more centralized, although some noted the emergence of regional hubs and rising middle power from the semi-periphery, including China (Barnett et al., 2016; Barnett & Wu, 1995; Chen & Barnett, 2000; Kondakci et al., 2017; Macrander, 2017; Mulvey, 2021; Restaino et al., 2020; Shields, 2012; Vogtle & Windzio, 2016).

Geographers approach migration from place-to-place relationships and emphasize the importance of "place" and "spatiality" in analyzing the phenomenon (Beech, 2014; King, 2012; King & Raghuram, 2013; Kolbel, 2020; Raghuram, 2013). They recommend putting more emphasis on "place" and perception of "place" while expanding the analytic focus beyond economically motivated decisions and traditional push/pull factors. One such study is Beech's (2014) paper applying Said's (1985) theory of imaginative geography. According to this theory, power relations between places and academic imperialism in higher education influence the portrayal of a place. The superior image of the country from colonial history shapes people's perceptions, and is reinforced by marketing and campaigns. The imaginative geography from this process influences students' decisions with regard to overseas education.

Another major influence on imaginative geography is "community." People who have previously experienced overseas education share their experiences, which influences others' perceptions of a place. This is common with the development of social networking websites, which make it even easier for the community to share their experiences. In this way, students' perceptions of particular spaces have been constructed through diverse sources, such as social networks and media, for a substantial amount of time, and the imaginative geography developed from their perceptions influences their decision to migrate (Beech, 2014).

Kolbel (2020) applied imaginative geography to explain ISM, while adding complexity to the ways individuals interact with dominant imaginaries. For instance, students' social identities from different class backgrounds impact how they form imaginative geography in a particular place, which leads to mobility decisions (Kolel, 2020). The imaginative geography of a particular place does not necessarily accurately represent reality, as information through different channels varies, and the image created by mass media and marketing campaigns can be biased. The objective measures of push and pull factors may not capture the value students place on a location.

Another relatively new group of studies, migration system theory and network theory, emphasize the importance of investigating multiple layers of dimensions and interactions between different levels of the system in analyzing international migration (Castles & Miller, 2009; O'Reilly, 2012). It integrates the macro structure of the system, such as interrelated networks due to dependence on historical, political, and economic relations; the meso level of personal and social networks, such as friends, family, and community; and intermediaries, such as migrant agencies, who mediate the connections between individuals and institutions (King, 2012; Faist, 2021). Network theory, which is often embedded in migration system theory, focuses on the interconnectedness of actors and relational factors.

In a similar way, sociologists explain ISM from Bourdieu's habitus: social, cultural, economic, and mobility capital. Their focus is how international education and student mobility disadvantage groups of students who have limited access to social, cultural, and economic capital and exacerbate existing gaps and reproduce or reinforce existing social hierarchies (Bourdieu, 1984; Cheung & Leung, 2015; Tuxen & Robertson, 2018; Waters, 2006). This also suggests that people's social, cultural, economic, and mobility capital have close relations to overseas

education. In particular, studies have shown that students are members of multiple networks and communities that enable cross-cultural exchanges beyond the nation-state border level (Bilecen, 2009; Gargono, 2009). Information or resources from interactions between members reduce the cost and risk of migration and impact their migration decisions and destination choices. Accumulated social capital plays an important role in migration decisions.

Many recent migration studies have demonstrated network effects using different empirical methods, and this has become a key factor in migration models (Boys, 1989; Faist, 1997; Haug, 2008; Pedersen et al., 2004; Wilpert, 1992). ISM studies are no exception. Social networks of friendship and kinship (Beech, 2014; Brooks & Waters, 2011), migrants' networks in the destination country (Beine, 2012), and membership in the Bologna Process (Vogtle & Windzio, 2016) were all found to be related to the volume of international students or students' study abroad decisions.

Many migration studies, including ISM research, acknowledge the complexity of the phenomenon and emphasize the importance of an interdisciplinary approach, while putting more weight on non-economic factors and interactions of different elements of the system (Boswell & Mueser, 2008; King, 2012; O'Reilly, 2012). Even with variations in focus and scope, the migration theories addressed above have their own values in explaining the different dimensions of flows. It is important to synthesize these views in analyzing migration flows rather than consider them incompatible. In the next section, the ways in which empirical studies have examined and explained the determinants of ISM with these theoretical frameworks is discussed.

What determines ISM is a popular topic, as it could provide practical advice to policy makers, higher education institution administrators, recruiters, and other stakeholders in international higher education. Understanding the factors that influence the direction and volume

of international students helps to estimate or predict possible changes in the current trend and to develop policies and strategies proactively. Accordingly, a number of empirical studies have identified these factors based on different methods, either qualitatively or quantitatively. This section reviews the literature on the influence of international student flows over time. The first part reviews the literature on historical trends over time, and the second part includes reviews of studies empirically testing the determinants of international student flows.

Trends and Historical Overview of International Student Mobility

Early records of ISM can be traced back to ancient times when foreigners went to universities in India, China, and the Middle East to study science, mathematics, religion, the arts, and architecture (Guruz, 2008; Rizvi, 2011). In medieval times, European universities hosted students from Asia and the Middle East (Rizvi, 2011). International student and scholar exchange has a long history, and different eras often show distinct patterns that reflect historical circumstances. Diplomatic purpose and elite-centered flows have become more for private good purposes, and are no longer restricted to certain privileged groups. The major source of funding has also changed. In the 1960s and 1970s, many students from developing countries were funded by government, private foundations, and agency scholarships to study in developed nations so that their acquired skills could be properly utilized in their country of origin for national development (Kritz, 2015). However, over time, more students have become self-funded, hoping that investment in foreign education will bring greater returns on their degree. To understand why these changes have occurred, it is necessary to examine the historical context, as this reveals a structural aspect of the trend. Rizvi (2011) illustrated this point in his recent study, stating, “Rationales underlying international mobility of students and scholars have been historically situated, located within a broader understanding of the global dynamics relevant to the particular

and shifting historical circumstances" (p. 694). Accordingly, in this section, the history of ISM and explanations for the shifting patterns are discussed.

Vaghese (2006) and Rizvi (2011) described the overall trend of international students and possible explanations for this trend with historical narratives. Overseas training during the colonial period provided a means to transfer the values of colonial power to their colonies and control them effectively (Goodwin, 1993; Varghese, 2008). The local elite group in the colony were trained in leading European universities with Western knowledge, values, and ideas of modernity and were expected to serve the empire through replicating or spreading those values to their local populations (Rizvi, 2011).

After the Second World War, the need to reconstruct and develop nations facilitated human resource flows overseas from developing countries to developed. Realizing that human resource development was key for national development, developing world governments invested in overseas training for a group of people who could be the base upon which to build their own academic capacity and university systems (Varghese, 2008). During the Cold War era, international student flows were largely affected by the funding and policies of Cold War rivals with the aim of containing each other's influence in developing countries (OECD, 2004; Varghese, 2008). Fulbright plans in the United States and similar programs in the Soviet Union were foreign aid programs designed to provide educational opportunities for talented students in newly independent countries, which was actually a part of the soft power strategies of the United States and Soviet Union to prevent those countries from falling into the other's influence (Rizvi, 2011).

The "aid" and "national development" rationale of ISM programs has been unpopular since the mid-to-late 1980s, as globalization and the General Agreement on Trade and Services

(GATS) have lowered barriers to trade in educational services and brought strong market forces, such as privatization of higher education and educational agents as middlemen, marking another turning point of mobility patterns (Rizvi, 2011; Shields, 2013). Higher education has become an important export industry for many countries and has brought competition for international students who can and are willing to bear the cost of higher education and contribute to revenue generation for institutions (Rizvi, 2011). The period of globalization is characterized by an interplay between an increasing demand for international higher education and the active engagement of institutions and government in the education market to lure international students. Some supply side policies, however, such as immigration regulations from governments, have fluctuated due to domestic political interests (Varghese, 2006). More diverse actors have become part of international higher education and have affected student flows, such as recruitment agents who connect institutions and international students, regional organizations that promote intra-regional flows through policy initiatives, and private companies that invest in international higher education.

Choudaha (2017), focusing on the period between 1999 and 2020, discussed the trends and events of ISM in three distinct waves. The first wave, 1999 to 2006, is characterized by the 9/11 terrorist attack in the United States, the pursuit of STEM research in institutions with the development of information and communication technologies, and Europe's bold movement toward strengthening its system to intra-region mobility.

The main event during the second wave between 2006 and 2013 was the global financial crisis, which resulted in budget cuts in higher education institutions. Compared to the focus on attracting global talent by governments in the first wave, institutions put more effort into recruiting international students who could pay higher tuition and fees themselves and ease

institutions' financial burden. This was accompanied by the growth of the middle class in China, which could self-fund the cost of international study, and an increase in Saudi Arabian students who were supported by government scholarships (Choudaha, 2017). Indian students, who were more sensitive to the cost of higher education, were discouraged from studying abroad due to the decrease in institutional funding due to the financial crisis (Choudaha, 2017). Japan continued to struggle with economic challenges and started to lose international students from other countries, who chose other attractive destinations instead (Choudaha, 2017).

The third wave, from 2013 to 2020, is characterized by three events: the economic slowdown in China, BREXIT, and the advent of the Trump administration (Choudaha, 2017). BREXIT and America First in the United Kingdom and United States, respectively, represent the rise of nationalism in higher education in many Western countries, which influenced the supply dimension of higher education in ISM and changed students' perceptions of those destinations into unwelcoming places (Altbach & de Wit, 2017; Weimer & Barlete, 2020). With anti-immigrant policies and the rise of nationalist populism in the United States and United Kingdom, international students started to find alternative destinations, as a decline in international student flows indicates (Amuedo-Dorantes & Romiti, 2021; Hacker & Bellmore, 2020; Laws & Ammigan, 2020). With these unfriendly immigration policies and economic slowdowns, the growth rate of the ISM from China was reduced. Some of the traditional source countries in Asia became new destinations, with more students seeking higher education at local costs and close distance. Although the United States and United Kingdom show signs of a decline in international student flows, it remains unclear whether the current nationalism trend in many developed nations will continue and change the overall patterns of ISM.

Choudaha (2017) concluded the study with the comment that the competition to attract international students between new and emerging destinations was still expected to increase. In summary, colonial powers' desires to preserve their influence on former colonies, Cold War rivalry, globalization and GATS, the rise of China as a great power, and growing nationalism in developed nations all shifted general patterns of international student flows.

There are also a number of studies on student flows in specific regions. Even though the regions covered in these studies are mostly EU countries or English-speaking major destination countries such as the United States, United Kingdom, Canada, and Australia, a growing number of studies are analyzing trends in other regions such as Asia and Africa. Ziguras and McBurnie (2011) analyzed the trends and patterns of ISM in Asia Pacific, the largest international student source region. Even though North America and Western Europe remain the top destinations for students in the region, they found countries in the Asia Pacific gradually decoupling the long-standing core-periphery pattern of international student flows from developing to the developed in the West while increasing intra-regional flows, which is aligned with the increase of regional trade and investments (Ziguras & McBurnie, 2011).

Another group of studies analyzing the historical trends of international students is from the world systems theory perspective. From this perspective, international migration is deterministic and heavily influenced by structural factors. The core, wealthy, and powerful countries maintain their advantageous positions using hegemonic power and resources, which structure the system into a status of disequilibrium between the core and the periphery (O'Reilly, 2012). According to this approach, the power hierarchy of the international political economy is reflected in various kinds of global flows, and the overall structure of the core and periphery is stable across time.

There are a group of international trade and migration studies analyzing people or commodity flows between countries to examine whether structural patterns are aligned with the world systems theory hypothesis. In a similar way, some studies have applied network analysis to determine whether the world systems theory explains ISM patterns over time. Barnett conducted three studies with coauthors to describe historical patterns in international student flows using network analysis (Barnett, 1995; Barnett et al., 2016; Chen & Barnett, 2000). All three studies covering different timeframes between 1970 and 2011 confirmed that academic hegemony exists, which is aligned with the hierarchical structure of the world system. The core is composed of the United States and several developed countries in Europe, such as Germany, the United Kingdom, and France, while African countries are positioned in the periphery. China is moving toward the core over time, and several semi-core countries have been detected.

Shields (2012) also found that the network connected through international students between 1999 and 2008 had become more centralized, and the structure of the network showed similarities to the network of international trade and international polity. This study marked Asia and the Middle East as emerging destinations, but this did not prevent the world from becoming less even over time. Another study covering a similar period, from 2000 to 2010 (Vogtle & Windzio, 2016), also indicated the stability of the network structure with the same core group of countries. Marcrander (2017) applied the same approach to global and regional networks in Europe, South America, Asia and the Pacific, and Southern Africa between 2008 and 2012 and reaffirmed the stable core-periphery positioning of countries.

On the other hand, Kondakci et al. (2018) asserted that the flows to new destinations, such as emergent regional hubs other than traditional destinations, could not be fully explained by the world systems theory, although the presence of the strong core group across time showed

evidence of the theory. Similarly, Hou and Du (2020) examined the network of international students between 2001 and 2015 and found that the dominance of the few Western developed nations in the network had decreased, while the importance of several regional hubs had increased. In summary, while these studies agree on the existence of the strong core group in the international student network, the semi-periphery group of nation-states does not necessarily follow the patterns predicted by world systems theory. In particular, studies covering more recent periods, such as after 2010, discuss the importance of regional hubs and regionalization in global higher education in explaining changes in structural patterns (Kondakci et al., 2018; Shields, 2010).

Other important factors in examining the historical trend of ISM are the impact of national, regional, and global shocks, such as the Asian financial crisis in 1997, September 11 in the United States, the global financial crisis, BREXIT, and COVID-19. For instance, U.K. higher education in the post-Brexit era results in higher costs of study from students in EU member countries (Liu, 2021; Marginson, 2017). However, at the same time, their migration policy is in favor of highly skilled migrants, which can be attractive to international students who plan to work and permanently migrate after graduation (Marginson, 2017). Under this higher education and immigration policy, the United Kingdom is expected to lose its position in the intra-region market with a higher cost barrier, while students outside Europe may find it more attractive, with a favorable highly skilled migration policy.

There are a number of recent studies predicting the impact of the global COVID-19 pandemic on ISM. Scholars expect a decrease in the physical mobility of international students, at least for a certain time, as well as a change in the landscape of international higher education through a greater supply and development of hybrid and online education (Tesar, 2020; Yıldırım

et al., 2021). Historically, national and regional shocks have influenced overall ISM to different degrees, but many of the affected countries have recovered. Wu (2020) stated that short-term shocks would not reverse long-term trends and should not disregard institutions' self-recovery capabilities. However, the recent pandemic COVID-19 and the rise of nationalism (e.g., the United Kingdom and the United States) are expected to negatively influence the trend of international flows for some time at least. How long the decline in student physical flows will continue and whether the overall flow patterns will be restructured after this crisis are open questions that depend on how countries and institutions respond to the crisis.

Determinants of International Student Mobility

One of the most popular topics in international student flows includes factors associated with changes in flow volume. Push and pull factors are most commonly mentioned in these studies, while many migration studies have applied the gravity model approach to empirically test these factors. Economic factors from the migration model and educational capacity and quality from human capital theory have been considered major factors in these studies. However, more recent studies have included network effects, policy impacts from the supply side, and various non-economic factors.

Although it is not possible or necessary to embrace all factors from different theories, the analysis in Chapters 4 and 5 will attempt to integrate many factors covered in different studies and across theories. This chapter serves as the groundwork for the next, which will test relational factors and other key variables of interest. This section addresses how previous studies identified determinants of international student flows by grouping them into economic, educational, policy, network, and other factors.

Economic factors. Migration theories, particularly world systems theory and neoclassical theory, consider economic factors in describing flows between two places. World systems theory explains how economic development and power relationships are reflected in sociocultural flows, including international education. Neoclassical theory considers wage differentials between two places to be the key element of labor migration. The push and pull model also applies various economic indicators in origin and destination countries that promote or discourage students from studying abroad. Gross Domestic Product (GDP) and GDP per capita have been included in many empirical models as measures of economic wealth, capacity, development, and the power of home or destination countries (Gonzalez et al., 2011; McMahon, 1992; Perkins & Neumayer, 2014; Wei, 2012; Zheng, 2012). In particular, GDP per capita has been used as a unilateral variable as an indicator of each country's income level, but also applied as a ratio of the pair, which can represent the wage differentials (Abbott & Silles, 2016).

Another essential part of the economic factor is related to the cost of international education. This includes migration costs plus tuition, fees, and cost of living compared to origin countries. Educational cost is one of the major hindering factors for ISM, and studies show that there are inverse relationships between high educational costs and student mobility (Ivy, 2001; Naidoo, 2007; Varghese, 2008). Woldegiorgis and Doevenspeck (2015) found that Scandinavian nations' tuition policies changed in 2011, imposing full tuition and fees on students from non-European countries, which led to a decrease in the number of student flows from poorer countries (e.g., African countries). They also found that the sensitivity of cost impact varied depending on higher education costs and income level in the origin country compared to the destination country (Woldegiorgis & Doevenspeck, 2015).

On the other hand, some studies show that the quality and reputation of higher education often offset the negative impact of cost (Naidoo, 2007; Soo & Elliott, 2010; Yang & Wang, 2016). These studies show that educational cost is not standalone as a factor, but interacts with other factors, such as educational quality, relative cost, and income level, and this affects students' preferences (Maringe, 2006; Maringe & Carter, 2007; Mazzarol & Soutar, 2002; Phang, 2013; Pimpa, 2003).

Although studies have generally found a negative role of migration cost in international studies (DeVoretz, 2006; Lowel & Khadka, 2011; Naidoo, 2007), it is important to consider the relative cost of migration and the income level of the origin country. For instance, a high wage level in the country of origin can be positively associated with student flows, as people can bear the cost of migration and invest in foreign studies (Brezis, 2016). Accordingly, Wei (2013) used Purchasing Power Parity (PPP) as a proxy for the price level and living expenses of home and host countries.

International trade measures have also been used to gauge a nation's involvement in and reliance on the international economy (Agarwal et al., 2007; McMahon, 1992; Zheng, 2012). Trade linkage between countries is often used instead of the aggregate measure of international trade (Zheng, 2012). For instance, McMahon (1992) used the trade concentration of the origin country to the destination in the pull model. Other economic variables include GDP per capita growth rate of the destination country as a measure for demand of labor, and unemployment rates as a measure for labor market environment (Abbott & Silles, 2016; Dreher & Poutvaara, 2005; Wei, 2012; Zheng, 2012).

Educational factors. The quality and capacity of higher education have been reported as major educational factors of ISM across studies. As explained in the human capital theory and

school-constrained model, students go abroad due to a lack of quality educational opportunities in their home countries or discrepancy of quality between their home and destination countries (Aslangbengui & Montecinos, 1998; Beine, 2013; Bhandari et al., 2018; Brooks & Waters, 2009; Gonzalez et al., 2002; Gordon & Jallade, 1996; Mesanza & Mariel, 2010; Rosenzweigh, 2006; Szelenyi, 2006; Wiers-Jenssen, 2008). The limited capacity of higher education in less-developed countries has pushed students to find their educational opportunities across borders (Kritz, 2015). In some cases, even with quality higher education institutions in their home country, students go abroad when the number of seats in those top institutions is limited, which leads to the demand for top schools exceeding the supply (Bhandari et al., 2018). This is often the case in East Asian countries, including China and South Korea.

Students' perceptions of high-quality education are also closely linked to the prestige and reputation of institutions, and they seek degrees that can be better recognized in both home and host country labor markets (Bourke, 1997; Kahanec & Králiková, 2011; Perkins & Neumayer, 2014; Shanka et al., 2005). Global rankings of higher education institutions in their origin or destination country have been most commonly used as a proxy for the quality of higher education. Scholars have estimated this quality in various ways. The rating of universities in the Shanghai global ranking (ARWU) top 100, 200, and 500 (Beine, 2012; Kahanec & Králiková, 2011; Thissen & Ederveen, 2006; Van Bouwel, 2009; Van Bouwel & Veugelers, 2013; Wei, 2012) or the top 200 of the World University Rankings (Perkins & Neumayer, 2014), and the mean value of each nation-state's institutional ranking (Abbott & Silles, 2016) are good examples. All these studies showed a significant effect or positive association with international student flows. Beine et al. (2012) even found that students were willing to bear higher costs of studying in foreign countries that were perceived to have a reputation for high quality tertiary

education. Other educational factors applied in previous studies include the student–teacher ratio and educational opportunities measured by the school enrollment ratio (McMahon, 1992; Wei, 2012).

Policy factors. A stream of studies has addressed policy dimensions related to ISM. Many have shed light on policy changes for one or a set of countries, mostly a few major destination nations such as the United States, Canada, Australia, and the United Kingdom, or EU/OECD member nations. These policies are usually implemented at the national level, such as student visa polices of the destination country, but there are also regional level policies; e.g., EU Erasmus+ program, the Association of Southeast Asian Nations (ASEAN)'s International Mobility for Students (AIMS) program, and the African Virtual University project (AVU).

The most common focus of these studies is immigration policy. In particular, highly skilled immigration and student visa policies, including post-study work regulations, could directly affect the volume of international student flows, considering that many international students plan to work or become permanent residents after graduation (Griddle, 2008; Sa & Sabzalieva, 2018). This was also highlighted in a recent UNESCO report (UNESCO, 2017). A growing number of international students place a greater value on work experience after studying in the host country for improved employment opportunities in both their home and host country, and some expect this work experience to pave the way for later skilled migration (Bhandari et al., 2018). Many studies have covered immigration policies in English-speaking countries, the main destination countries for international students. These studies have consistently shown a close relationship between immigration policy and ISM (Gopal, 2016; Lomer, 2018; Sa & Sabzalieva, 2018; She & Wotherspoon, 2013).

Gopal (2016), in a comparative study of visa and immigration policy trends in four English-speaking countries, showed that immigration policies in these countries influenced the flow of international students. For instance, Canada's International Education Strategy and Australia's Student Migration Pathway between 2005 and 2007 were national initiatives aiming to attract more international students, which increased international student enrollments. Unfortunately, in Australia, the implementation of the initiative without a proper quality check and regulations on unethical practices resulted in stricter regulations on student immigration visas; accordingly, the number of international students has fallen (Wheelahan, 2012). This decrease was somewhat recovered with the Australian government's active involvement in and systemic management of international higher education through the Provider Registration and International Students Management Systems (PRISMS). Also, a cross-sector council, "Council for International Education," was created in 2016 with diverse representation, and is expected to coordinate and implement international higher education policies (Sa & Sabzalieva, 2018). The outcome of this government body on ISM is too early to be measured, but it is a positive step toward improving the overall international education policy environment.

Both countries understand the importance of visa policies in attracting international students, and national governments play an active role in advancing their position in global competition for international students and global talent (Gopal, 2016). On the contrary, the United Kingdom has tightened its immigration policies for non-EU countries, including student visas, since the late 2000s to secure U.K. citizens' jobs and national borders (She & Wotherspoon, 2013). Compared to the open and welcoming immigration policy for international students under Tony Blair's Prime Minister Initiative (PMI and PMI2) between 1999 and 2010, the U.K. government, run by the conservative party, has introduced restrictions on student visas

and post-study work visa policies since 2010 by setting targets for reductions in the number of students (Lomer, 2018). The Highly Skilled Migrants Program was phased out and replaced with the point-based system (PBS), and the Post Study Work Scheme was abolished (Sa & Sabzalieva, 2018; She & Wotherspoon, 2013). This change resulted in a decreasing number of incoming international students, particularly Indian students, who consider post-study work opportunities to be a key driving factor in study abroad (Bhandari et al., 2018).

The United States is another case of stricter regulations imposed on immigration policies since 9/11, which led to a decline in the number of international students, particularly from the Middle East (Gopal, 2016). Although the restrictions have been somewhat reduced compared to the years after 9/11, the United States has not put much effort into attracting and retaining international students (Sa & Sabzalieva, 2018). In general, U.S. and U.K. immigration policies have been more controlled and politicized than Canada and Australia (Sa & Sabzalieva, 2018; She & Wotherspoon, 2013). Even though the degree of impact varies, immigration policy on international students is not a standalone factor; rather, it is connected to the political swings of each country at the time. Immigration policy targeting international students is generally shaped in a way that is aligned with the collective goals of the nation at the time, and reflects power struggles from diverse social and political relations in the host nation (She & Wothersppon, 2013).

Along with immigration policies, there are other nation-level educational policies directly targeting the internationalization of higher education. One of these examples is the Study in China Plan. The Chinese government has implemented higher education reforms and initiatives to enhance its position in the global higher education market and increase its soft power with the ISM as a cultural diplomatic tool since 2000s (Kuroda, 2014; Wu & Chan, 2019). The plan

includes making China the top destination in Asia by 2020 and setting target numbers for international student recruitment for degree programs. Also, the government has increased scholarships to international students who study in prestigious universities (Wu and Chan, 2019). China met its target goal of international student recruitment in 2017, and the government continues implementing state-driven initiatives, including the action plan that connects the ISM and the Belt and Road Initiative (Wu & Chan, 2019). Saudi Arabia's government also promoted international higher education with extensive funding for students. For instance, King Abdullah Scholarship Program (KASP) funded over 200,000 Saudi students for foreign degrees between 2005 and 2015, which facilitated the growth of outbound students (Allahmorad, 2020). Other countries' policy initiatives to build world-class universities and integrate internationalization performance indicators for funding and evaluations are also relevant policy factors (Chin, 2019; Oleksiyenko et al., 2021; Shin and Yang, 2019).

In relation to these national higher education policy factors, some studies included government, public, and total expenditure on tertiary education as a proportion of GDP or GNP. It reflects the national priority placed on the higher education sector and is linked to a higher likelihood of investment in a better educational environment, grant scholarships, and research facilities, which elevates the quality and reputation of higher education from the receiving nations and provides more resources, including financial support and educational opportunities for study abroad in sending countries (Gonzalez et al., 2010; McMahon, 1992; Wei, 2012).

Network effect. Most recent studies on international migration, including student mobility, emphasize network factors. It is supported by many theories, such as imaginative geography theory, transnational social space, and other sociology studies that emphasize the role of social capital on international student flows. Studies based on these theories reveal that

information from the community students belong to and networking play important roles in decision making. In many empirical studies, the strong impact of bilateral migrant stock on international migration has been emphasized and termed "network impact" (Czaika & Parsons, 2015; Mayda, 2010; Pedersen et al., 2008; Perkins & Neumayer, 2014; Ramos, 2016; Vogler & Rotte, 2000).

Massey et al. (1993) defined migrant networks as "sets of interpersonal ties that connect migrants, former migrants, and non-migrants in origin and destination areas through ties of kinship, friendship, and shared community origin" (p. 19). Network ties become a form of social capital that provides information and resources on destinations. The presence of a network in the destination country and the exchange of information in the community influence students' decisions to choose a specific destination. In particular, existing networks in the destination of people of the same nationality provide information and assistance, which can reduce the costs of settling and ease the migration process (Clark et al., 2002; Dreher & Poutvaara, 2005; Hatton, 2003; Mayda, 2010; Mitchell & Pain, 2003; Nelson, 2015; Pedersen et al., 2004). Information spillover to the origin country through connections of the network encourages more migration, as it reduces cost and risk for new migrants, hence increasing net returns on migration (Massey et al., 1993; Pederson et al., 2008; Ramos, 2016).

Studies have found a positive relationship between migrant stocks or foreign students from students' origin countries and ISM (Abbott & Silles, 2016; Beine et al., 2012; Bessey, 2007; Dreherr & Poutvaara, 2005; Perkins & Neumayer, 2014). Beine (2014) empirically tested the network effect of three groups: all migrants, migrants with post-secondary education, and migrants without upper secondary education. These three groups were termed total, high-skilled, and low-skilled networks, respectively. Findings suggest that there is a strong network effect in

ISM for all three groups, and the elasticity of the lower-skilled network is stronger than the total migrant network (Beine, 2014).

Czaika and Parsons (2015) also confirmed the finding that lower-skilled migrants were more sensitive to network effects, and explained that this was because they were more affected by migration costs. Beine (2013) emphasized that the variability explained by the network effect was around one-third, and declared it an important component of the migration model. He noted that the network functioned as an information channel for newcomers and prospective students, providing information on educational programs, educational quality, and career opportunities in the destination nation-state (Beine, 2013). Studies based on focus group interviews and surveys have also confirmed the role of family, friends, and other communities of students in their study abroad decisions (Beech, 2014; Mazzarol & Soutar, 2002; Van Mol & Timmerman, 2014). Recommendations and resources from social links and kinship provide students with knowledge and information about foreign countries, which shape their perception of destination countries.

Another relevant factor is the relational ties between countries, as explained in migration theories using historical and structural approaches. The networks formed between countries through different relationships also affect the general trend of international student flows. Good examples of these relational ties include historical connections from colony relations and economic interdependence through preferential trade policy. For instance, a study focusing on the relationship between bilateral trade volume and international student migration found positive correlations between the two (Wei, 2013). For this result, Wei (2013) explained that bilateral trade volume, a gauge for economic connections between the two countries, would influence ISM, as a stronger economic relationship would boost trade and the exchange of higher educational services.

Common memberships between countries also link member countries and form their networks. Transnational ties between paired nation-states that are connected by common memberships in intergovernmental organizations (IGOs) could indicate that they tend to share values and perspectives in international policy. Accordingly, it is likely that the more their memberships overlap, the closer their international relations are. The close relationship and shared values are more likely to promote favorable policies between them, including those for education and the labor market. As Rutkowski (2008) explained, the IGOs themselves influence the member nation-states' national education policy toward "soft convergence."

The interconnectedness and interaction of the member nation-states within the IGOs influence their national policy in a certain direction. Bearce and Bondanella (2007) demonstrated the "institutional socialization hypothesis" in their study, showing that the common membership of IGOs of nation-states affected their interest to converge over time. Similarly, Taninchev (2015) found that more interaction within IGOs promoted nation-states' interest convergence over time. Whether it is the IGOs or the member nation-states themselves, the common membership of IGOs could influence national policy related to global education and immigration, which would ultimately affect ISM.

Other non-economic factors. Non-economic factors are a critical part of migration studies. The population of the two places and their distance, which includes both physical and cultural distance from the gravity model, have been found to influence migration decisions. Geographically close, historically linked, and/or culturally similar countries, including a common language, are likelier to reduce the barrier of migration financially and psychologically; hence, they are positively related to a greater volume of inflows (Dreher & Poutvaara, 2005;

Gonzalez et al., 2010). Higher populations in the origin place or country function as demographic pressure and push people to migrate to other places (Levatino, 2016).

In ISM studies, some of these factors have been replaced with factors that are more relevant to international higher education. The tertiary education student population, rather than the total population, has been applied in empirical models (Beine et al., 2012; Wei, 2012). International mobility studies have found that most students prefer English-speaking countries to countries with shared languages, as they consider improving their foreign language skills to be a reason for studying abroad. English, as the most commonly used language in industry, higher education, and research, is the most strongly preferred language (Abbott & Silles, 2016; Adsera & Pytlikova, 2015; Altbach, 2007; OEDC, 2014; Kahanec & Králiková, 2011; Rodriguez et al., 2011). However, there is also a finding that the role of language and geographical proximity in ISM is not as important as before, as more higher education institutions around the world establish English-taught degree programs (Bista et al., 2018; Mazzarol & Soutar, 2002).

Other non-economic push/pull factors in previous studies include the number of patents approved in the home country as an indicator of IT development, democracy scores, better climate, political stability, and perceptions of safety (Agarwal et al., 2008; Caruso & de Wit, 2015; Dreher & Poutvaara, 2005; Gonzalez et al., 2011; Wei, 2012).

Based on the findings and theoretical explanations from previous studies, economic and educational factors, network effects, immigration policy, and other non-economic factors are examined in both this chapter and the next.

CHAPTER 3

DATA AND METHODS

Data

The main objective of this study is to describe the overall trend of international student flows from country, regional, and global levels and to explain what factors are associated with changes in the overall trend and flow patterns. Accordingly, global flows of international college students and indicators of related explanatory factors are the major data applied in this analysis. The main data sources in this study are international organization statistics, such as UIS, OECD statistics, and the World Bank Databank.

There are certain advantages to using these data sources. Their data collection procedures are well systematized and documented. Once data are collected, these international organizations review submitted data and check for errors or inconsistencies. If any errors or issues are detected, they communicate with the country's respondents and update the data accordingly. This process enables a certain level of data quality and accuracy to be maintained.

Additionally, internationally agreed-upon and shared standards for data collection are used, such as the International Standard Classification of Education (ISCED). Member countries are required to follow guidelines when submitting their own data. This makes data from different countries comparable and readily usable for analysis. Economic indicators measured by different currencies have purchasing power parity-adjusted measures, which makes comparison easier, and inflation-adjusted measures across different time periods are provided. With this

convenience and data reliability, these data sources are widely used for research and data analysis. In particular, UNESCO is renowned as the world depository of global education data, and the World Bank provides open access to a variety of global indicators.

For global flow data of college students, this study uses data on total inbound and outbound internationally mobile tertiary students from the UIS. Internationally mobile students here refer to foreign (nonresident visa status) students who are seeking tertiary degrees. UIS stores various measures for international education, including internationally mobile students, which are collected from countries annually. These countries report their numbers based on UNESCO's guidelines and data definitions. In this study, the total inflows and outflows of international students for 206 countries [1]between 1999 and 2017 were extracted and examined. A magnitude of nil or negligible was coded as 0, while missing data were not imputed but dropped from analysis, which led to the coverage of 68–112 countries for international student inflows and 204–206 for outflows.

This study also uses country grouping information. The classifications of nation-states by geographic region, levels of income, and development are based on the standards of the United Nations Statistics Division (UNSD). Information on membership in the EU, ASEAN, and OECD was extracted from each organization's website. As income group distinctions, the status of membership in the EU, ASEAN, and OECD are time-variant, with the composition of each group differing by year. These time-invariant (geographical region) and time-variant (income group, OECD and EU membership) data were merged into student flow data and used for analysis to describe and compare trends and patterns by country groupings.

[1] Tokelau, Virgin Islands, British, Montserrat, Gibraltar, Anguilla, Virgin Islands, U.S., and American Samoa were excluded from analysis as they are territories, not nations

Other data used in this study are country-specific information. First, a group of economic indicators was extracted from the World Bank's World Development Indicators database. This includes GDP, GNI per capita, unemployment rate, and PPP. Second, demographics indicators used in this study are college-age population and population density. Third, as a measure of a nation's economic dependence on international trade and the degree of economic globalization, trade as a share of GDP and the total number of IGO memberships as a measure of a nation's network with other nations were collected from the World Bank and the correlations of war projects, respectively. In addition, data on the volume of international migrant stock in each nation as a measure of migrant networks were taken from the United Nations Population Division (UNDP) website. As international migrant stock data are reported and collected every five years, the coverage of time is limited.

Fourth, higher education related measures include a set of global ranking indicators and gross enrollment ratios in tertiary education. Two global ranking measures, Academic Ranking of World Universities (ARWU) and QS World University Rankings, were used as a proxy for the quality and reputation of higher education institutions. Even though these two measures are highly correlated, with a correlation coefficient of 0.9, they measure different dimensions of quality. QS rankings measured academic and employer reputation based on a survey of experts (50% of the total weight), while ARWU places much weight on research outputs and innovation measures (90% of the total weight). For better descriptions of the reputation and quality of higher education, the number of institutions ranked in the top 200 for each country was collected from both ranking websites, and the average of the two was used in the analysis.

Finally, migration policy indicators were extracted from the United Nations World Population Policies (WPP) database to examine how these unilateral policies were associated

with international student flows. WPP data cover a wide range of population policies and trends for over 100 countries between the mid-1970s and 2019, and is updated biennially. The data include various measures of migration policy at the national and regional levels, and these policy measures were generated from the survey answers of each country's officers. Data on highly skilled workers policy were used in this study. This indicator shows whether each country raised, maintained, or lowered the annual level of immigration policies for highly skilled workers. If countries did not have any official policies, they were marked as having "no official policy."

A recent international migration report by the UN Population Division (2019) showed that 63% of reported countries had some type of immigration policies targeting highly skilled workers. Forty percent of countries implemented immigration policies to increase the inflows of highly skilled workers, 19% maintained policies at current levels, and 5% of governments had restrictive policies (UN, 2019). As the WPP indicators only measure a change in direction, they provide limited information on immigration policies. Even with its limitations in the scope of information from the data, studies have found that immigration policy is a key factor influencing the volume of international student flows, as discussed in the previous section. For this reason, these measures were integrated and tested in the model.

Educational variables, government expenditure on higher education, and social protection measures were collected from the World Bank or UNESCO. However, due to many missing values, they were excluded from the main pull and push model.

Missing data. The coverage of data for each variable is described in Appendix 1. Out of 206 countries, 79–92 were included in pull models. This accounts for 38% to 45% of the total countries. The small number of countries included in the models was mostly because many countries did not report the total inbound international students to UNESCO. For instance,

between 1999 and 2017, the number of countries with data on total international student inflows ranged from 70 to 111. Even for countries with inflow numbers, the number of years they reported varies. Panel data analysis for push and pull factors was restricted to countries with data for at least 50% of the years in each model. For instance, if a pull model's full-year coverage was between 2004 and 2017, countries with complete data for at least seven years during the period were included in the model. Push models with total outbound students as a dependent variable had much better data coverage: 97%–100% of the total nations.

Missing data on flows vary by country and year. There are two types of missing data: countries that have data in certain years but not all, such as China, which had total inflow data only since 2006, accounting for about 2–3% of total international student inflows; and countries that did not report the number of inbound international students throughout the entire period of analysis. Out of the 206, 42 nation-states[2] (about 20%) are in this group. About half of them are in sub-Saharan Africa or the Caribbean. Countries without any international student inflow data are listed in Table 1, and Table 2 shows countries by number of missing years on international student flow data. Only 30 countries had complete inflow data between 1999 and 2017, while 200 of 206 countries had outflow data for the same period.

[2] The 42 countries are Angola, Bahamas, Belarus, Bolivia (Plurinational State of), Cook Islands, Curaçao, Dominica, Ethiopia, Micronesia (Federated States of), Guinea-Bissau, Equatorial, Guinea, Guatemala, Haiti, Kiribati, Liberia, Libya, Nigeria, Nicaragua, Niue, Nauru, Panama, Peru, Papua New Guinea, Puerto Rico, Paraguay, Sudan, Solomon Islands, Sierra Leone, San Marino, Somalia, South Sudan, Sao Tome and Principe, Suriname, Syrian Arab Republic, Timor-Leste, Tonga, Tuvalu, Uruguay, Saint Vincent and the Grenadines, Vanuatu, and Zimbabwe.

Table 1 Proportions of Nation-States without any International Student Inflow Data

UNSD Region	The number of countries	Countries without Student Inflow Data	Countries with Student Inflow Data	Missing %
Africa	54	13	41	24%
Americas	42	15	27	36%
Asia	50	2	48	4%
Europe	44	2	42	5%
Oceania	16	10	6	63%

World Bank Region	The number of countries	Countries without Student Inflow Data	Countries with Student Inflow Data	Missing %
East Asia and Pacific	34	11	23	32%
Europe and Central Asia	54	2	52	4%
Latin America and the Caribbean	39	15	24	38%
Middle East and North Africa	21	2	19	10%
North America	3	0	3	0%
South Asia	7	0	7	0%
Sub-Saharan Africa	48	12	36	25%

Table 2 Missing Values for International Student Flow: Count of Countries by the Number of Missing Years

The Number of Missing Years	Count of Countries (Inflow)	Percentage of Total (Inflow)	Count of Countries (Outflow)	Percentage of Total (Outflow)
0	30	15%	200	97%
1	11	5%	0	0%
2	10	5%	0	0%
3	8	4%	0	0%
4	3	1%	0	0%
5	3	1%	0	0%
6	3	1%	1	0%
7	6	3%	0	0%
8	6	3%	0	0%
9	2	1%	0	0%
10	7	3%	0	0%
11	9	4%	0	0%
12	11	5%	2	1%
13	5	2%	3	1%
14	10	5%	0	0%
15	8	4%	0	0%
16	6	3%	0	0%
17	13	6%	0	0%
18	13	6%	0	0%
19	42	20%	0	0%
Total	206	100%	206	100%

The proportions of missing data for student inflows were greater for developing nations than developed. The average proportion of countries with inflow data for developing countries was only 32% (40–60 out of 154), compared to 79% (39–46 out of 52) for developed nations. Similarly, the coverage of nations with the number of inflow students for OECD members was 91%, compared to 36% for non-member nations. Although the OECD and developed nations have more complete data, this study does not restrict analysis to these economically developed nations, as this would fail to explain emerging destination countries from non-OECD members or developing nations. Along with the pull and push models for the world, this study also includes a separate subgroup analysis with pull and push models for developing nations and developed nations.

Data on push and pull factors for nation-states also have missing values, as shown in the descriptive table. Many possible explanatory variables, such as government expenditure on higher education as a proportion of GDP, the human capital index, and the global competitiveness index in higher education, were initially collected but excluded in push and pull models due to high proportions of missing values. Data on push and pull factors in the analysis have proportions of missing values between 1% and 42%. However, if restricted to countries with any student inflow data, it becomes less than 20%. The final sample numbers for world pull models are between 237 and 1,120, while world push models have higher sample numbers ranging between 1,731 and 3,190. The world pull model with the smallest sample number tests the network effects of international migrant stock in each country. As the United Nations collects data on international migrant stock every five years, only four years can be added. With the global ranking indicators in the same model, year coverage was further restricted. Therefore, even with migrant stock data available for all countries with international student inflow

information, the number of years covered in the model resulted in fewer final sample numbers than the other categories. In the same way, data on the total number of IGOs were available only until 2015, while immigration policy data are collected biannually. All these differences are reflected in the variance of the final sample numbers for each pull and push model.

The proportions of countries in the world push and pull models by region are shown in Tables 3 and 4. The largest proportion of missing nations in pull models are mostly small island countries in Oceania and the Caribbean, and the proportion of Southern Asian countries in the analysis is only a third of the total nations in the region. For the Oceanian countries missing in the analysis, the total inflow numbers were less than 8,000 between 2004 and 2017, which is less than 0.2% of the world, and one-third of the Southern Asian countries in the analysis accounted for over 90% of total inflows in the region. Except for these three subregions, the rest had at least 64% of nations in analysis. Therefore, even though many countries were excluded from pull models, the sum of student inflows in the basic pull model accounted for about 87% of the world total. Pull models had better coverage of countries in the region, ranging between 67% and 100%. The sum of student outflows in the basic push model was around 83% of the total outflows.

Because missing data were not random, multiple imputation for missing data was not a feasible option, as imputation cannot account for systemic differences between the missing group and its counterpart. Therefore, this study was conducted with limitations from missing data.

Table 3 World Pull Model Coverage by Region (the Basic Model with Key Variables)

UNSD Sub-Region	Analysis (Pull-Basic)	Total	Coverage
Australia and New Zealand	2	2	100%
Central Asia	4	5	80%
Eastern Asia	6	7	86%
Eastern Europe	10	10	100%
Latin America and the Caribbean	6	39	15%
Melanesia	0	3	0%
Micronesia	0	5	0%
Northern Africa	4	6	67%
Northern America	2	3	67%
Northern Europe	10	10	100%
Polynesia	0	6	0%
South-eastern Asia	7	11	64%
Southern Asia	3	9	33%
Southern Europe	10	15	67%
Sub-Saharan Africa	11	48	23%
Western Asia	11	18	61%
Western Europe	6	9	67%

Table 4 World Push Model Coverage by Region (the Basic Model with Key Variables)

UNSD Sub-Region	Analysis (Push-Basic)	Total	Coverage
Australia and New Zealand	2	2	100%
Central Asia	5	5	100%
Eastern Asia	5	7	71%
Eastern Europe	10	10	100%
Latin America and the Caribbean	33	39	85%
Melanesia	3	3	100%
Micronesia	4	5	80%
Northern Africa	5	6	83%
Northern America	2	3	67%
Northern Europe	10	10	100%
Polynesia	4	6	67%
South-eastern Asia	10	11	91%
Southern Asia	8	9	89%
Southern Europe	10	15	67%
Sub-Saharan Africa	44	48	92%
Western Asia	16	18	89%
Western Europe	7	9	78%

Methods

This chapter uses descriptive summaries, graphs, and panel data analysis to examine trends in international student flows. Descriptive statistics and data visualization using different types of graphs are good starting points when exploring overall patterns and summarizing general trends. Data visualization, if used properly, can supplement number-only tables to present observable patterns in an easier way and deliver information from it. Therefore, before the main analysis, this study first examines a general outlook of the phenomenon at the world, regional, and country levels through descriptive summaries and graphs. Differences in international student flows by geographical region, OECD member versus non-member nations, developed versus developing countries, and income groups are also presented.

To understand the relationships between selected pull or and factors and the volume of flows, correlation tests were conducted. In selecting possible factors, this study refers to findings from previous literature on ISM and the relevant factors of migration theories. Some of the explanatory variables were log transformed due to their nonlinear relations with flows. Then, all explanatory continuous variables were scaled before the panel data models. Although not all variables were included in the analytic models, correlations of all potential variables were tested first to show general relationships between international student flows and diverse aspects of national characteristics.

The selected variables were divided into five groups: economic, education, demographic, global, and policy measures. These variables were selected to reflect the migration theories' explanations presented in Chapter 2 and to test the additional variables of research interest. Economic indicators include GDP, GNI per capita, GDP per capita, GDP growth, and unemployment rate. The education group includes Global Competitiveness Index (GCI) in higher

education, gross enrollment in tertiary education, pupil–teacher ratio in tertiary education, and global rankings of higher education institutions for each country. Demographic indicators, college-age population, proportion of youth, population growth, and population density were grouped, and the next group relates to global involvement, trade as a proportion of GDP, the number of IGO memberships, international migrant stock, and the proportion of migrants in the population. The last group is composed of governance and policy-related factors: government expenditure on tertiary education as a proportion of GDP, government effectiveness, control of corruption, and political stability.

First, variables with a high proportion of missing data were excluded. Then, after checking correlations, highly correlated variables were identified, and the variance inflation factor (VIF) for explanatory variables in push and pull models was tested to address possible multicollinearity issues. All variables had VIF values of less than 4, mostly close to 1, except for GDP in the pull model (about 3.7), which does not exceed the "risky threshold" of 5–10 described in the previous literature (Neter et al., 1989; O'Brien, 2007; TAY, 2017).

Panel data analysis of the selected variables was conducted to test the hypothesized relationships between the volume of international flows and a set of push and pull factors. Panel data analysis, which combines cross-sectional and time-series data, is a useful tool in analyzing a trend for the same entities over time, as it allows controlling for unobservable time-invariant characteristics with fixed effects, and more observations increase the power of the analysis. Additionally, due to its strength in analyzing dynamics of change, panel data is well suited for tracking student mobility over an extended period.

Along with their advantages, measuring the values of a variable over multiple years has a risk of serial correlations, so-called autocorrelation, which indicates that values of a particular

time are more likely to be correlated with its past time values. Having autocorrelation problems in panel data analysis would lead to smaller standard errors, inflated test statistics, and a greater chance of Type I errors, which would increase the false rate of statistical significance. With the use of cross-sectional data from multiple countries, there is also a risk of heteroskedasticity, indicating that the variance of error terms is not constant due to correlations with any of the independent variable(s), which violates one of the regression assumptions: constant variance of error terms. In order to detect whether each model had these issues, diagnostic tests (Durbin-Watson test for autocorrelation and Breusch-Pagan Test for heteroskedasticity) were conducted, and final results were reported with heteroskedasticity and autocorrelation consistent (HAC) standard errors when any of these issues were found.

Another set of tests for panel data regression regards the selection of models between pooled regression, random effects, and fixed effects models. The fixed effects model assumes that omitted variables in the model vary across nations but are constant over time. In fixed effects models, binary dummy variables representing each nation-state are added to the control for influences of omitted variables that are time-invariant. However, as it controls for nation-specific time-constant effects, relationships between time-invariant factors, such as region and language of the country and international student flows, cannot be measured. The random effect model, on the other hand, assumes that the nation-state specific effect is random and not correlated with the selected explanatory variables. For each analytic model, the Breusch-Pagan LM test was used to choose between pooled Ordinary Least Squares (OLS) and random effects models first, and then the Hausman test was conducted to choose the fixed effect or random effect model. The Breusch-Pegan Lagrange multiplier test followed, to check whether time fixed effects were required. The final push and pull models represent the choices from these tests.

Along with push and pull models for the world, models for developing and developed nations were tested. For pull factors, OECD pull models were explored. The reason a pull model for OECD nation-states was separately designed is that OECD countries had fewer missing values for selected key variables, hence wider data coverage of relevant indicators. For instance, most variations in one of the major indicators, the number of higher education institutions ranked in the top 200 global rankings, were concentrated in this group of countries. The distribution of this measure was highly skewed, with many zeros, so it was more suitable to focus on this group as the factors of interest. In addition, as many studies have pointed out, these countries account for about 75% of the total inflows. Even though focusing on this group fails to represent the whole world, it is still informative to test pull factors for the subgroup countries and check the differences in results with the world pull models. The OECD provides data for annual wage levels for each member country, so it is also useful to test the models with this indicator instead of GNI per capita.

Following McMohan's (1992) perspective, this study tests two models: 1) the origin-specific push factor model with the total number of outbound students for each sending country, and 2) the destination-specific pull model with the inflow of international students for each receiving country. Both models include subgroup analysis for comparing push and pull factors between developing and developed nations. For pull factors, a pull model for OECD member nations was added with annual wage-level data instead of GNI per capita.

Push model (outflow of international students, origin country-specific factors). The push model explains the volume of outbound international students with a set of origin country factors that push domestic students away from their countries for tertiary education. Previous studies on international migration and student flows have identified various push factors. Among

them, unemployment rate (labor market environment), the volume of college-age population, income level (GNI per capita), population density, global engagement measures from trade as % of GDP, and the number of IGO memberships are tested in push models. The gravity theory explains that migration is proportional to the size of a country; population in human migration, and GDP in international trade (Anderson, 2011; Ravenstein, 1885; Tinbergen, 1962). Accordingly, a larger college age population can be a positive push factor. Also, as the neoclassical theory expects, migration patterns generally flow from low to high wage countries. Therefore, a negative coefficient is expected. The unemployment rate in a student's home country, an unstable political situation, and greater resource competition will push people abroad. These, in turn, are expected to serve as positive coefficients in push models.
The push model can be expressed as,

$$
\begin{aligned}
&Log(Total\ Outflows)_{it} \\
&\quad = \beta_1 Log(GNI\ per\ capita)_{i(t-1)} + \beta_2 Unemployment_{i(t-1)} \\
&\quad + \beta_3 Log(College\ Age\ Population)_{i(t-1)} + \beta_4\ Log(\#\ of\ IGOs)_{i(t-1)} \\
&\quad + \beta_8 Log(Population\ Density)_{i(t-1)} \\
&\quad + \beta_9 Trade\ (\%\ of\ GDP)_{i(t-1)} \beta_8 Log(Political\ Stability)_{i(t-1)} + a_i + \lambda_t + u_{it}
\end{aligned}
$$

where i and t denote nation-state and year respectively,
a_i is the country-specific intercept, λ_t is the year-specific intercept, $\beta_1 \sim \beta_9$ represent coefficients of time-variant explanatory variables, and u_{it} as the error terms.

Pull model (inflow of international students, destination-specific factors). The pull model describes international student flows from the destination country perspective, such as what factors attract students to study abroad and select a destination. Pull factors used in this study include economic indicators (economic development and income level), educational variables (higher education quality represented by the global rankings), global engagement level

represented by the number of total IGO memberships, immigration policy for highly skilled workers, and network effects from international migrant stock. For global ranking data, the number of higher education institutions listed on the Top 200 ARWU and QS rankings for each country were collected first. Then, the average of the two was used as a proxy for the reputation and quality of higher education. The GNI per capita was replaced by the average annual wage in the OECD pull model.

As described in Chapter 2, economic indicators are a key part of traditional migration theories, including the neoclassical and world system theories. According to explanations rooted in the neoclassical theory, international students are expected to choose countries with higher income levels. They will also prefer countries with lower migration costs, as higher costs will reduce the present value of expected net benefit of migration. Therefore, Gross National Income per capita (GNI per capita) is more likely to have positive coefficients in pull models, while purchasing power parity, as a proxy for the cost of living, should be inversely associated with international student inflows. Educational variables can be associated with human capital theory. Students are more likely to choose countries with quality higher education institutions, as these will bring them competitive advantages in the labor market, based on the skills and credentials they acquire from those institutions. According to this explanation, countries with greater numbers of top-ranked higher education institutions will attract more students. Both network theory and imaginative geography expect that the more migrants in a destination country there are in a destination country, the more likely it is that a network effect will emerge and result in a larger subsequent inflow of people. The number of intergovernmental organization (IGO) membership can be associated with the migration system theory. Country-to-country networks formed through intergovernmental organization membership could generate a route for cultural

and educational exchanges among member countries, which will also function as a positive pull factor.

The correlation between GNI per capita and OECD annual wage was highly correlated, with a correlation coefficient of 0.92, which implies that the GNI per capita captures much of the OECD wage levels. The dependent variables, student inflows, were log transformed after adding 1. The English-speaking indicator was initially included in pull models, but was automatically dropped as all models required individual fixed effects. Higher education related variables, government effectiveness, global competitiveness index in higher education, political stability, and Gini coefficient were also dropped due to too many missing values.

Five pull models were designed to address the research questions of interest: 1) traditional migration and higher education variables, 2) network effect, 3) immigration policy, 4) global engagement, and 5) higher education gross enrollment ratio. All models had GDP, PPP, GNI per capita, and global ranking measures in common. The pull models can be expressed as,

Pull Model 1: Basic Model

$$Log\ (Toital\ Inflows + 1)_{it}$$
$$= \beta_1\ Log\ (GNI\ per\ capita)_{i(t-1)}$$
$$+\ \beta_2\ Log\ (Average\ Global\ Rankaings + 1)_{i(t-1)} + \beta_3\ Log\ (GDP)_{i(t-1)}$$
$$+ \beta_4\ Log\ (Purchasing\ Power\ Parity)_{i(t-1)} +\ \alpha_i +\ u_{it}$$

Pull Model 2: Basic Model with network effects

$$Log\ (Toital\ Inflows + 1)_{it}$$
$$= \beta_1\ Log\ (GNI\ per\ capita)_{i(t-1)}$$
$$+\ \beta_2\ Log\ (Average\ Global\ Rankaings + 1)_{i(t-1)} + \beta_3\ Log\ (GDP)_{i(t-1)}$$
$$+ \beta_4\ Log\ (Purchasing\ Power\ Parity)_{i(t-1)}$$
$$+\ \beta_5\ Log\ (International\ Migrant\ Stock + 1)_{i(t-5)} +\ \alpha_i +\ u_{it}$$

Pull Model 3: Basic Model with changes in immigrant policy for high-skilled workers

$$Log\ (Toital\ Inflows + 1)_{it}$$
$$= \beta_1\ Log\ (GNI\ per\ capita)_{i(t-1)}$$
$$+\ \beta_2\ Log\ (Average\ Global\ Rankaings + 1)_{i(t-1)} + \beta_3\ Log\ (GDP)_{i(t-1)}$$
$$+ \beta_4\ Log\ (Purchasing\ Power\ Parity)_{i(t-1)}$$
$$+\ \beta_5\ \text{Immigration Policy for High skilled workers(Raise)}_{i(t-1)} +\ \alpha_i +\ u_{it}$$

Pull Model 4: Basic Model with global engagement measures

$$Log\ (Toital\ Inflows + 1)_{it}$$
$$= \beta_1\ Log\ (GNI\ per\ capita)_{i(t-1)} +\ \beta_2\ Log\ (Average\ Global\ Rankaings + 1)_{i(t-1)}$$
$$+ \beta_3\ Log\ (GDP)_{i(t-1)} + \beta_4\ Log\ (Purchasing\ Power\ Parity)_{i(t-1)}$$
$$+\ \beta_5\ \text{Log(The number of Intergovernmental Organization Memberships)}_{i(t-1)}$$
$$+\ \beta_6\ \text{Trade (\% of GDP)}_{i(t-1)} +\ \alpha_i +\ u_{it}$$

Pull Model 5: Basic Model with gross enrollment ratios in tertiary education

$$Log\ (Toital\ Inflows + 1)_{it}$$
$$= \beta_1\ Log\ (GNI\ per\ capita)_{i(t-1)}$$
$$+\ \beta_2\ Log\ (Average\ Global\ Rankaings + 1)_{i(t-1)} + \beta_3\ Log\ (GDP)_{i(t-1)}$$
$$+ \beta_4\ Log\ (Purchasing\ Power\ Parity)_{i(t-1)}$$
$$+\ \beta_5\ \text{Log(Gross Enrollment Ratio, Tertiary Education)}_{i(t-1)} +\ u_{it} +\ \varepsilon_{it}$$

where i and t denote nation-state and year respectively,

a_i is the country-specific intercept, λ_t is the year-specific intercept, $\beta_1 \sim \beta_6$ represent coefficients of time-variant explanatory variables, and u_{it} as the error terms.

All explanatory variables in both the pull and push models except for international migrant stock, were lagged one year considering the effect of time. For international migrant stock data, five years were lagged.

CHAPTER 4

ANALYSIS, RESULTS, AND FINDINGS

An analysis of international student flow patterns and determinants was conducted at three levels: 1) the world, 2) subgroups such as OECD members and geographical regions, and 3) countries. First, flow patterns in the world between 1999 and 2017 are described with summary tables and graphs. Second, at the regional level, differences in the volume of international students flow across sub-groups and inter-/intra-regional flow trend by geographical region are explained with trend graphs and summary tables. Europe and Southeast Asia are additionally analyzed in relation to their regional higher education initiatives. Next, top sending and receiving countries between 2005 and 2015 are identified with a summary of their international higher education policies. Then, correlations between international student flow and selected variables are presented. Finally, panel data analysis based on ordinary least square estimations is followed to test relationships between inbound and outbound international students and selected pull/push factors.

Descriptive Patterns of International Student Mobility

Starting with the general flow trend, the total flow of international students has increased by about 2.7 times from 2 million to 5.3 million between 1999 and 2017 (Figure 1). The average annual growth during this period was 5.5% with the highest in 2002 (13%) and the lowest in 2004 (1.6%). The continued growth in international student flow between 1999 and 2017 (Figure 1) can be explained by globalization and neoliberalism. The General Agreement on Trade in

Service (GATS) in 1995 promoted liberalization and trade in education service, and international higher education has become more market driven. As increasing number of countries in the world have regarded international higher education as an export industry, many national governments strategically supported higher education institutions' marketing and recruitment activities. Fierce competition between higher education actors within and across countries and commercial activities also characterizes the shifting patterns within globalization. In addition to these supply side changes, the demand for international higher education has grown. All these factors may have contributed to the continued growth of international student flow.

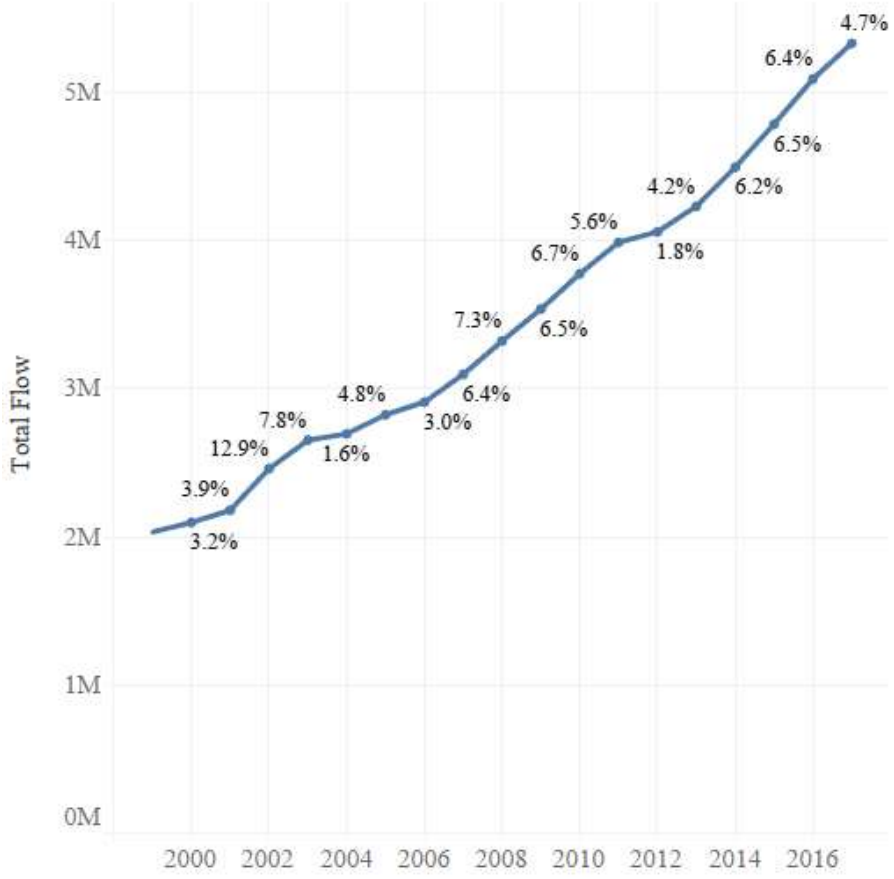


Figure 1 International Student Flow and Annual Growth between 1999 and 2017

Total outflow by country and year range from 8 to 928,365 while inflow range from 0 to 984,898. The average, median, and standard deviation of international student flow by year are listed in Table 5. The mean is greater than the median for both inflow and outflow, indicating that there are many countries with low flow values and a few with exceptionally high flow values. Both graphs in Figure 2 confirm that there are a certain number of outliers with high values such as U.S. and U.K. inflow and China and India outflow. Boxplots (Figure 2) and standard deviations (Table 5) show that variations of international student inflow are greater than outflow. Also, the variations of international student flow numbers across countries have increased over time.

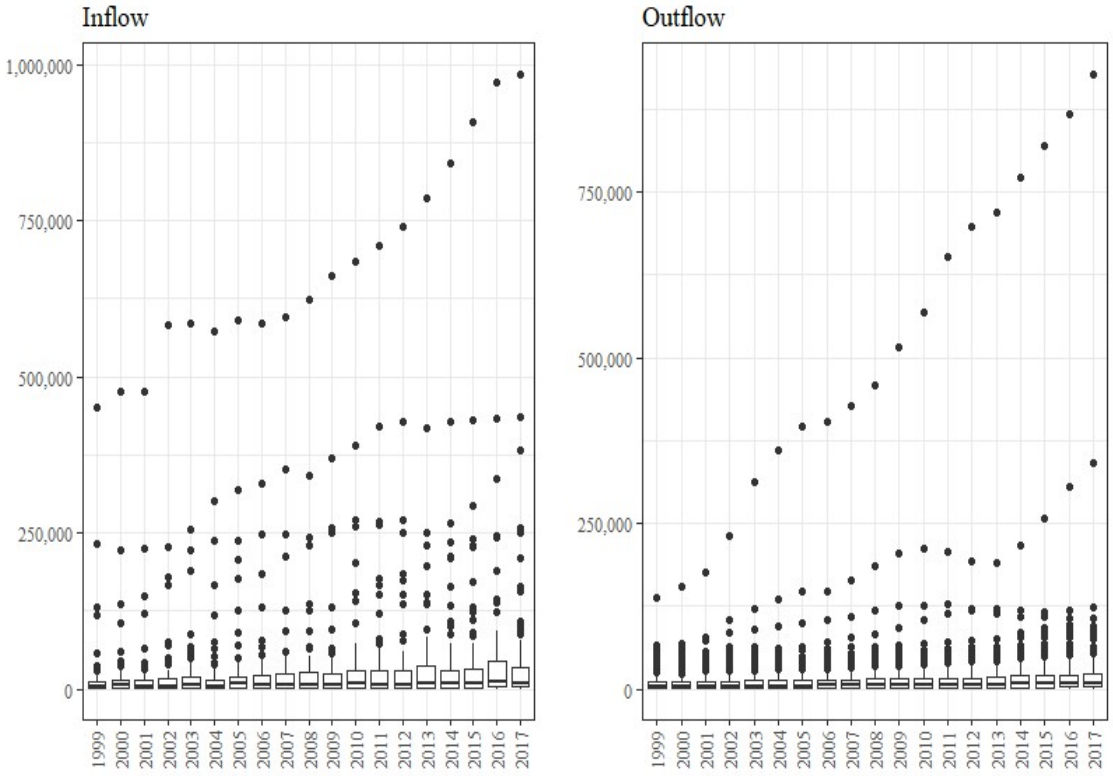


Figure 2 Boxplots of International Student Flow by Year

Two trend graphs in figure 3 further describes distributions of international student inflow and outflow by percentile rank group. Countries were ranked by the number of inbound and outbound international students each year and were grouped by their percentile rank. As the graphs show, the bottom 10% and 25% of countries did not send out or receive any international student. On the other hand, the top 25% of the countries had over 75% of the international student flow. Between 1999 and 2017, the inflow market shares of top 10% countries decreased. However, the top 50% countries took almost the whole share of the international student flow market. Around 50% of countries had not sent out or received any students and remained inactive throughout the time period. Even though the number of international students increased over time, not all countries experienced growth. In terms of the composition of each group, only about 12% of countries below the 50 percentile group in year 2000 were able to move to the top 50 percentile group in year 2015. This unequal growth will be further highlighted at regional and country levels in later sections.

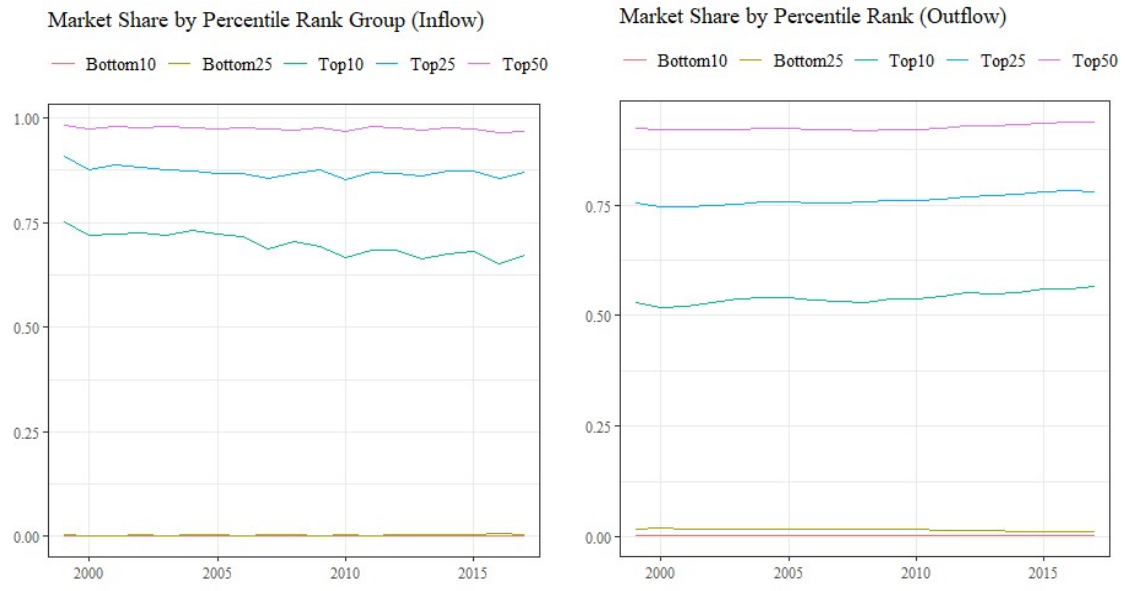


Figure 3 International Student Market Share by Each Quantile Group

Table 5 Total International Student Flow by Year

Year	Inflow					Outflow				
	Mean	Median	Std.Dev.	Minimum	Maximun	Mean	Median	Std.Dev.	Minimum	Maximun
1999	19,612	2,720	61,207.5	0	451,935	8,854	3,615	15,353.4	11	137,622
2000	22,385	5,519	64,563.0	0	475,169	9,188	3,948	16,154.9	11	154,602
2001	22,372	3,850	64,235.1	0	475,168	9,674	4,107	17,579.1	15	176,475
2002	25,994	4,488	76,523.9	0	582,996	10,824	4,402	21,367.9	16	230,401
2003	26,552	5,247	76,135.6	0	586,316	11,823	4,895	26,451.1	29	312,647
2004	26,204	4,677	75,859.2	0	572,509	11,883	4,729	29,332.8	31	360,676
2005	29,622	5,343	82,215.6	0	590,158	12,441	4,849	31,845.7	22	396,477
2006	28,034	5,455	78,665.1	0	584,719	12,838	5,114	32,422.0	23	403,174
2007	29,837	6,706	80,275.2	0	595,874	13,651	5,414	34,410.3	18	426,716
2008	30,885	6,389	82,213.5	0	624,474	14,601	5,790	37,053.4	20	458,102
2009	31,888	6,599	86,018.2	0	660,581	15,636	6,127	41,348.7	25	516,357
2010	34,135	9,060	89,513.5	0	684,807	16,571	6,789	44,844.5	22	567,984
2011	32,507	5,435	87,292.5	0	709,565	17,477	7,162	50,111.8	22	653,174
2012	33,091	6,862	89,755.4	0	740,482	17,493	6,506	52,454.7	8	698,522
2013	38,250	8,265	98,999.0	0	784,427	18,127	6,933	53,936.7	11	719,436
2014	39,713	8,914	102,535.8	0	842,384	19,519	7,341	57,910.2	15	770,784
2015	41,283	7,636	107,766.5	0	907,251	20,807	7,534	62,050.0	28	819,855
2016	45,127	10,381	112,633.4	0	971,417	22,194	7,884	66,343.1	15	868,319
2017	45,568	8,867	115,744.8	0	984,898	23,105	8,370	70,916.8	29	928,365

International student mobility at the regional and subgroup Level. There are differences across regions in the magnitude of the growth and the overall trend. To explore these differences, flow trends for subgroups of countries between 2005 and 2017 were further examined. As there are many missing values in the total number of inbound international students for each country between 1999 and 2004, these years were dropped in analysis.

The first sub-groups are OECD[3] versus non-OECD and developed versus non-developing nations. T-test results (Table 6 and 7) confirm that there are statistically significant differences in international student flow between OECD and non-OECD, and between developed and developing nations. Also, the median of OECD group is much bigger than the non-OECD group's median. On average, wealthier and developed nations receive more students while developing nations send more. Even though the volume of inbound and outbound international students between 2005 and 2017 increased in both developed and developing countries, the trend graphs of international student inflow (Figure 3) show a large gap between groups. Developed countries are still popular destinations for international students, and there are some common factors across developed nations that attract foreign college students seeking degrees.

Table 6 International Student Flow by OECD Membership

	# of Countries	**Inflow**				
		Mean	SD	Median	Minimum	Maximum
OECD	35	69,928	129,990	25,361	207	984,898
Non-OECD	177	10,676	23,372	2,480	0	250,658

t (577) = -11.37, p <0.001

	# of Countries	**Outflow**				
		Mean	SD	Median	Minimum	Maximum

[3] Out of 38 OECD members, only 35 countries were coded as 'OECD member countries' as three countries (Lithuania, Colombia, and Costa Rica) became members later than 2017.

OECD	35	26,340	25,661	15,100	2,164	127,872
Non-OECD	177	12,685	45,480	4,146	7	928,090

t (1,445) = -10.05, p <0.001

Table 7 International Student Flow by Development Level

	# of countries	**Inflow**				
		Mean	SD	Median	Minimum	Maximum
Developed	53	51,354	113,064	13,150	3	984,898
Developing	155	10,792	19,393	2,763	0	157,108

t (797) = 9.79 *p* <0.001

	# of countries	**Outflow**				
		Mean	SD	Median	Minimum	Maximum
Developed	53	17,683	19,596	11,592	11	122,195
Developing	155	13,784	48,800	4,114	7	928,090

t (3,845) = 3.57 p <0.001

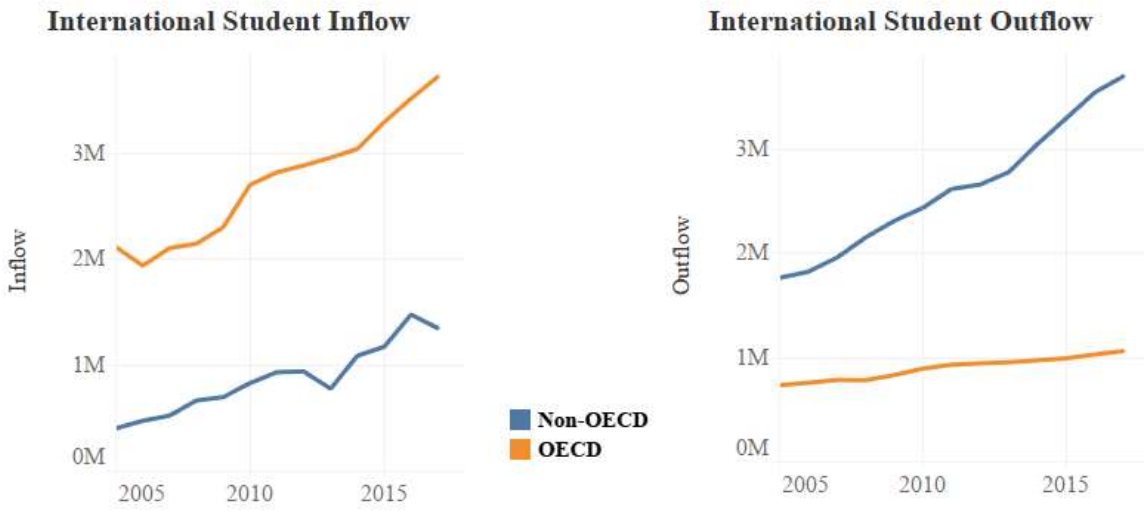


Figure 4 Trend of International Student Flows (OECD vs. Non-OECD)

However, during the same period, the inflow student market share of OECD countries between 2005 and 2017 decreased from 84% to 73%. Similarly, the share of developed nation inflow and outflow decreased from 89% to 77%. On the other hand, non-OECD members and developing nations increased their market share in both inflow and outflow. While most non-OECD/developing countries sent more students than they received, they expanded their market

share in the inflow market, from 16% to 27% for non-OECD nations, and 11% to 23% for developing nations. The statistics indicate that some popular destinations for international students in OECD and developed nations lost their market share while at least some of the counterparts had gained market share and emerged as strong actors in the market. The country-level analysis will address what countries in each group have gained and lost market share over time.

Regional group differences in international student mobility. Next, based on regional subgroups defined by the United Nations Statistics Division (UNSD), regional differences in international student flow were explored. Figures 5 and 6 show the overall trend of international student flow by UNSD subregion between 2005 and 2015. According to the trend graphs in Figure 4, along with traditionally popular destinations, Eastern Asia and Eastern Europe experienced relatively high growth during the period. For outflow, Eastern and Southern Asia show remarkable outflow growth during the period (Figure 5).

As many regions experienced growth, the percentages of international students each subregion hosted and sent out provides additional information on the dynamics of their relative positions. Tables 7 and 8 present the market share, changes in the market share, and compound annual growth rates between 2005 and 2017 by subregion.

In the inflow market, Southern Asia and Western Asia show the biggest compound annual growth rates with 14% and 10% respectively. Eastern Europe and Western Asia gained about 3% in market share while Western Europe lost the most market share with a 5% decrease. For the outflow market, as shown in the trend graphs, three subregions have grown the most: Central, Western, and Southern Asia. Among them, Southern Asia expanded the market share most while sub-Saharan Africa lost the most outflow market share.

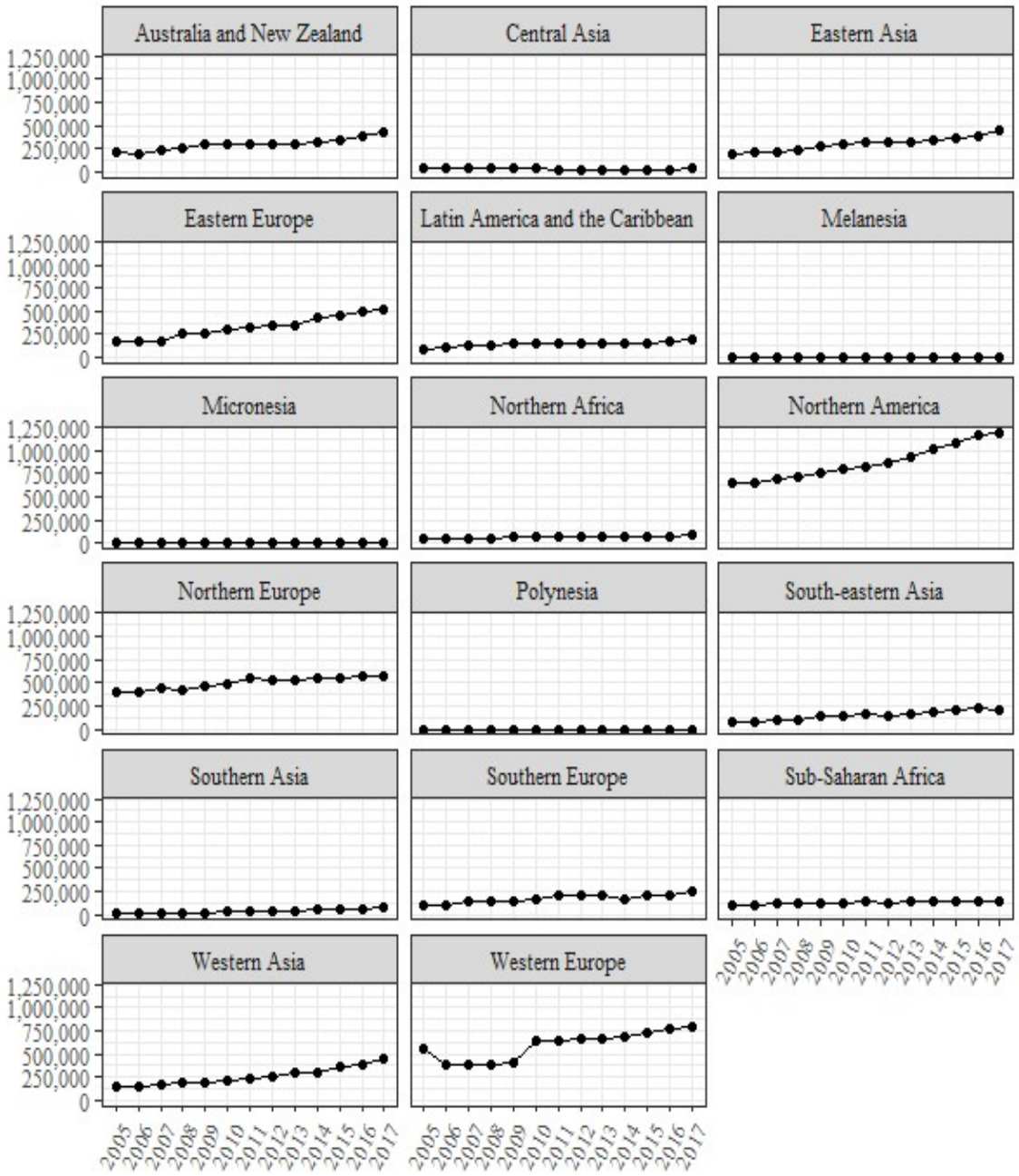


Figure 5 International Student Inflow Trend by UNSD Subregion

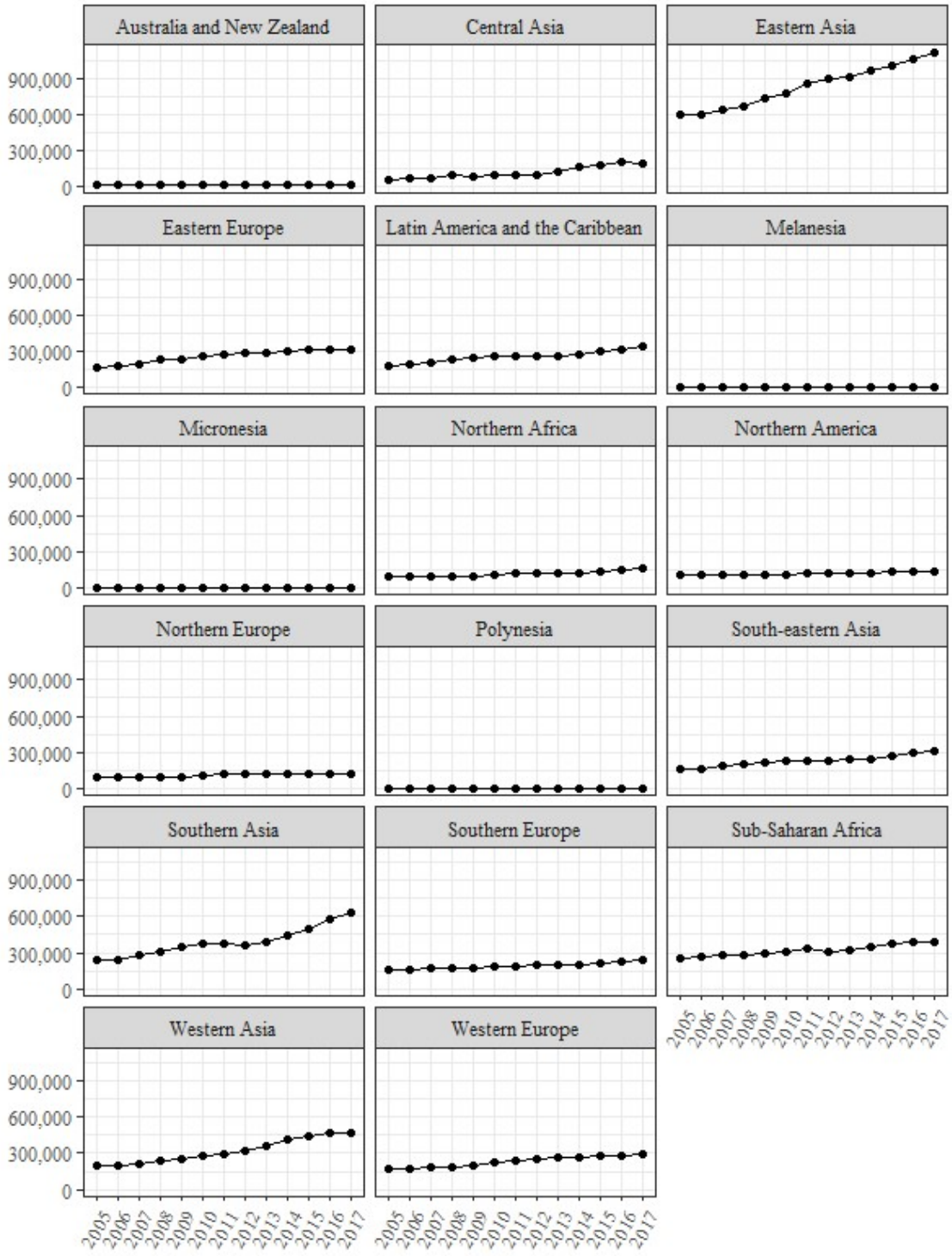


Figure 6 International student Outflow Trend by UNSD Subregion

Table 7 International Student Inflow Market Share Change and Compound Annual Growth Rate by UNSD Subregion

UNSD region	UNSD sub-region	2005	2017	Market Share Change (Inflows)	Compound Annual Growth Rate (CAGR)
Africa	Northern Africa	1.6%	1.6%	0%	6%
	Sub-Saharan Africa	3.7%	2.6%	-1.1%	2%
Americas	Latin America and the Caribbean	3.2%	3.7%	+ 0.5 %	7%
	Northern America	23.5%	22.3%	-1.2%	5%
Asia	Central Asia	1.2%	0.6%	-0.6%	0%
	Eastern Asia	7.0%	8.3%	+1.3%	7%
	South-eastern Asia	2.8%	3.7%	+0.9%	8%
	Southern Asia	0.5%	1.3%	+0.8%	14%
	Western Asia	5.2%	8.4%	+3.2%	10%
Europe	Eastern Europe	6.5%	9.6%	+3.1%	9%
	Northern Europe	13.8%	10.6%	-3.2%	3%
	Southern Europe	3.6%	4.5%	1%	8%
	Western Europe	19.8%	14.7%	-5.1%	3%
Oceania	Australia and New Zealand	7.8%	8.1%	+0.3%	6%
	Melanesia				
	Micronesia				
	Polynesia		0.0%		

Table 8 International Student Outflow Market Share Change and Compound Annual Growth Rate by UNSD Subregion

UNSD region	UNSD sub-region	2005	2017	Market Share Change (Outflow)	Compound Annual Growth Rate (CAGR)
Africa	Northern Africa	3.8%	3.3%	0%	4%
	Sub-Saharan Africa	10.2%	8.2%	-2%	4%
Americas	Latin America and the Caribbean	7.3%	7.2%	0%	5%
	Northern America	4.1%	2.9%	-1%	2%
Asia	Central Asia	2.5%	4.1%	2%	10%
	Eastern Asia	24.0%	23.5%	0%	5%
	South-eastern Asia	6.5%	6.4%	0%	5%
	Southern Asia	9.4%	13.2%	4%	9%
	Western Asia	7.7%	9.9%	2%	8%
Europe	Eastern Europe	6.7%	6.7%	0%	6%
	Northern Europe	3.7%	2.6%	-1%	2%
	Southern Europe	6.6%	5.1%	-1%	3%
	Western Europe	6.6%	6.1%	0%	5%
Oceania	Australia and New Zealand	0.5%	0.4%	0%	3%
	Melanesia	0.2%	0.1%	0%	3%
	Micronesia	0.1%	0.0%	0%	2%
	Polynesia	0.1%	0.1%	0%	2%

Inter-/intra-regional flow trend. Next, using bilateral data, the proportion and number of intra-/inter-regional flow of students were analyzed. Although central government and state-level policies have a more direct influence on promoting and regulating international student flow, and international higher education is still framed within national boundaries, inter-governmental and regional policies may impact the overall patterns of international student mobility. For instance, regional organizations such as the European Higher Education Area (EHEA), the Association of Southeast Asiana Nations (ASEAN), and the African Union (AU) promote intra-regional student flow through favorable policies and scholarship opportunities. Also, in South America, the educational sector in Mercosur (SEM) since 2006 and other educational initiatives have used the regionalization of higher education as a strategic tool for economic development (Batista, 2019).

While more elaborate studies are needed to determine whether regional policy initiatives positively influenced international student mobility, examining changes in the trend of inter- and intra-regional student flow after those initiatives can provide preliminary information on their impact. Note that this analysis is based on another set of data, bilateral flow data, which has missing values. For instance, student flow from bilateral data only accounts on average for 63% of the total flow between 1999 and 2017, ranging from 40% to 89%. As bilateral data since 2003 has over 70% of the total flow information, results prior to 2003 may fail to represent the overall trend. Therefore, this section focused on the trend after 2003.

Overall, international student flow within the region (intra-region) increased slightly more than inter-regional flow between 2003 and 2017. The compound annual growth rate for intra-regional flow was 6.2% while inter-regional flow was 6.1%. There are differences by region.

Figure 6 shows the overall trend of inter-/intra-regional outflow between 2003 and 2017. Except for Oceania, both intra-and inter-regional outflow had increased. Particularly, intra-regional outflow increased the most in Europe and Asia. In Asia, even though the growth rate for intra-regional flow is 1.3% higher than inter-region flow, the overall growth is much higher in inter-region flow. Table 9 shows the growth of outbound international students within or between regions by UNSD subregion. All regions in Europe and Latin America and the Caribbean sent out more students within the region than between regions. Particularly, Eastern Europe shows the biggest intra-region growth. On the other hand, Eastern, Central, and Southern Asia had much more growth in inter-regional outflow.

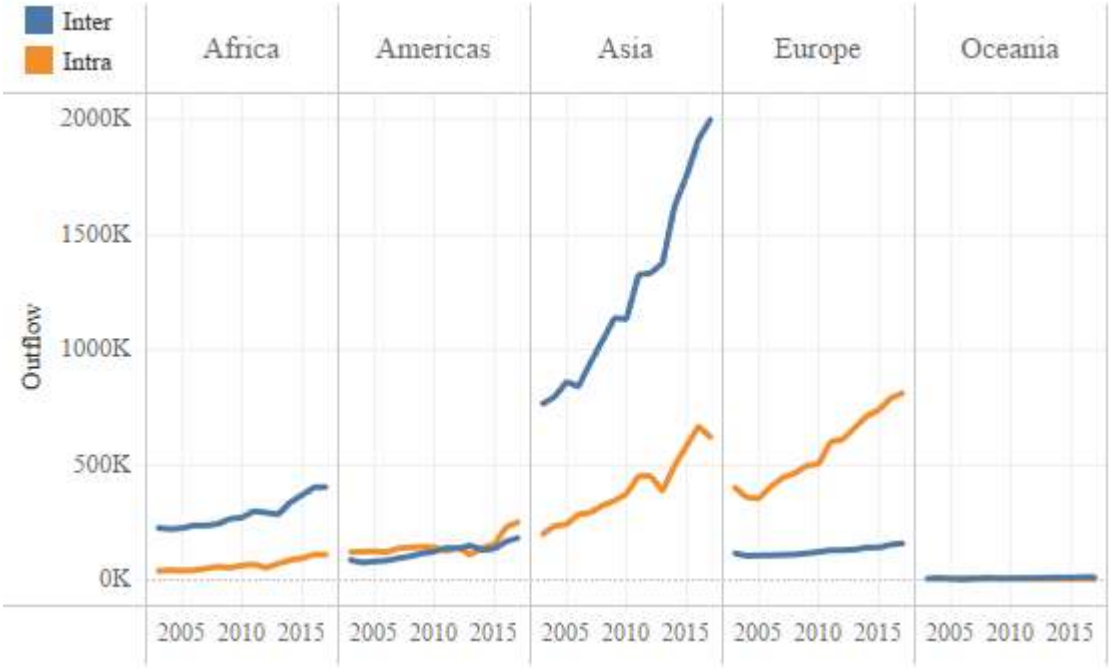


Figure 7 Trend of Inter/Intra-Region Outflow (2003~2017)

Table 9 Inter-/Intra-Region Outflow Growth by UNSD Subregion (2003 ~ 2017)

Origin Region	Origin Sub-region	Inter-Region Outflow		Intra-Region Outflow		Net Intra-Outflow Growth
		Growth (2003~2017)	CAGR	Growth (2003~2017)	CAGR	
Africa	Northern Africa	54,968	3.5%	3,916	15.8%	-51,052
	Sub-Saharan Africa	122,959	4.6%	67,116	7.0%	-55,843
Americas	Latin America and the Caribbean	68,426	6.6%	106,881	5.8%	38,455
	Northern America	28,172	3.7%	23,832	3.7%	-4,340
Asia	Central Asia	129,954	13.6%	20,664	5.4%	-109,290
	Eastern Asia	534,566	6.7%	97,613	4.6%	-436,953
	South-eastern Asia	78,241	3.4%	59,416	10.2%	-18,826
	Southern Asia	305,973	8.2%	127,268	15.6%	-178,705
	Western Asia	187,588	7.9%	116,262	12.1%	-71,326
Europe	Eastern Europe	159	0.0%	201,007	9.1%	200,848
	Northern Europe	-538	-0.1%	21,978	2.0%	22,516
	Southern Europe	18,622	4.5%	75,358	3.3%	56,736
	Western Europe	24,579	4.2%	111,831	4.8%	87,252
Oceania	Australia and New Zealand	6,153	4.3%	-960	-1.5%	-7,113
	Melanesia	260	3.2%	-25	-0.1%	-285
	Micronesia	419	15.3%	56	3.6%	-363
	Polynesia	161	2.4%	-78	-1.2%	-240

In the same way, Figure 7 shows the inter-/intra-region inflow trend by UNSD subgroup region between 2005 and 2015. The Americas and Oceania show larger inter-region inflow and growth than intra-region inflow while Africa and Asia have larger intra-region inflow and growth than inter-region inflow. Europe experienced growth in both inter- and intra-region inflow. Table 10 shows the growth and compound annual growth rates of intra-/inter-region inflow by UNSD subgroups. All subregions in Asia, Africa, Latin America and the Caribbean, and Western Europe had positive net intra-inflow growth between 2005 and 2015, with the biggest growth in Eastern Asia. On the other hand, Australia, New Zealand, and North America had much higher inter-region growth. The growth and changes of intra-region flow in Latin Americas and the Caribbean, Asia, and Europe might be associated with their regional higher education policies. This possibility will be further discussed in the next section.

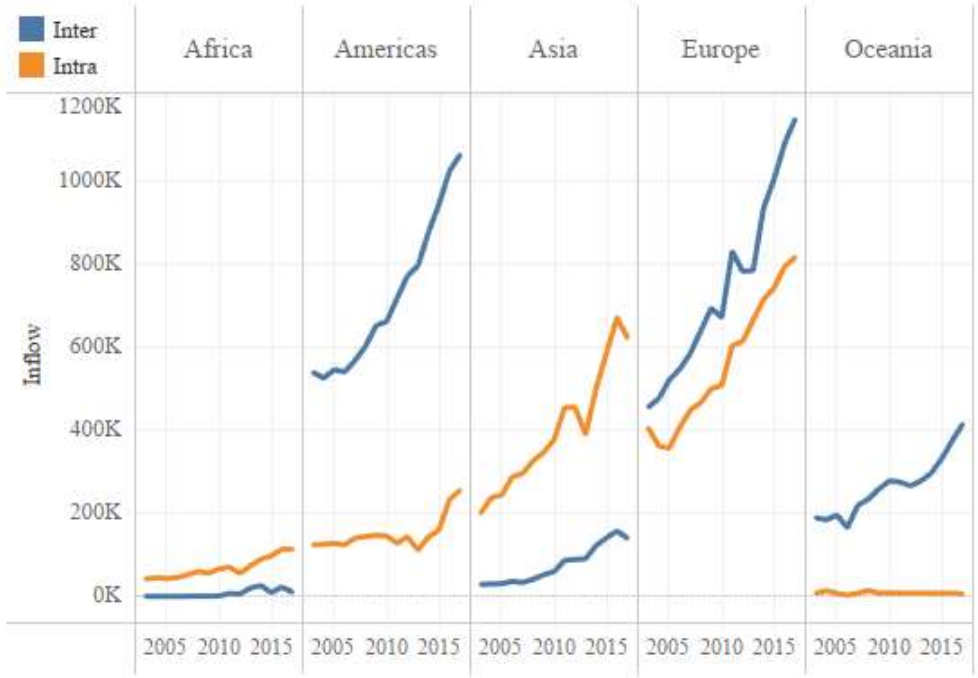


Figure 8 Trend of Inter/Inter-Region Inflow (2003~2017)

Table 10 Inter-/Intra-Region Inflow Growth by UNSD Subregion (2003 ~ 2017)

Destination Region	Destination Sub-region	Inter-Region		Intra-Region		Net Intra-Flow Growth
		Growth (2003~2017)	CAGR	Growth (2003~2017)	CAGR	
Africa	Northern Africa	3,161	13.6%	18,412	14.5%	15,251
	Sub-Saharan Africa	7,330	32.0%	52,620	6.2%	45,290
Americas	Latin America and the Caribbean	13,861	12.7%	111,115	15.6%	97,254
	Northern America	508,499	4.9%	19,598	1.2%	-488,901
Asia	Central Asia	-613	-1.8%	9,839	3.0%	10,452
	Eastern Asia	11,695	7.0%	157,671	6.7%	145,977
	South-eastern Asia	22,437	14.2%	55,021	7.4%	32,584
	Southern Asia	12,678	13.3%	46,112	16.6%	33,434
	Western Asia	65,506	14.1%	152,579	12.3%	87,073
Europe	Eastern Europe	248,404	15.0%	124,323	8.5%	-124,081
	Northern Europe	180,663	5.3%	58,389	2.4%	-122,275
	Southern Europe	76,046	6.4%	38,916	3.4%	-37,130
	Western Europe	186,116	5.0%	188,546	6.4%	2,430
Oceania	Australia and New Zealand	224,880	5.7%	-1,068	-1.0%	-225,948
	Melanesia	NA	NA	NA	NA	NA
	Micronesia	NA	NA	NA	NA	NA
	Polynesia	NA	NA	NA	NA	NA

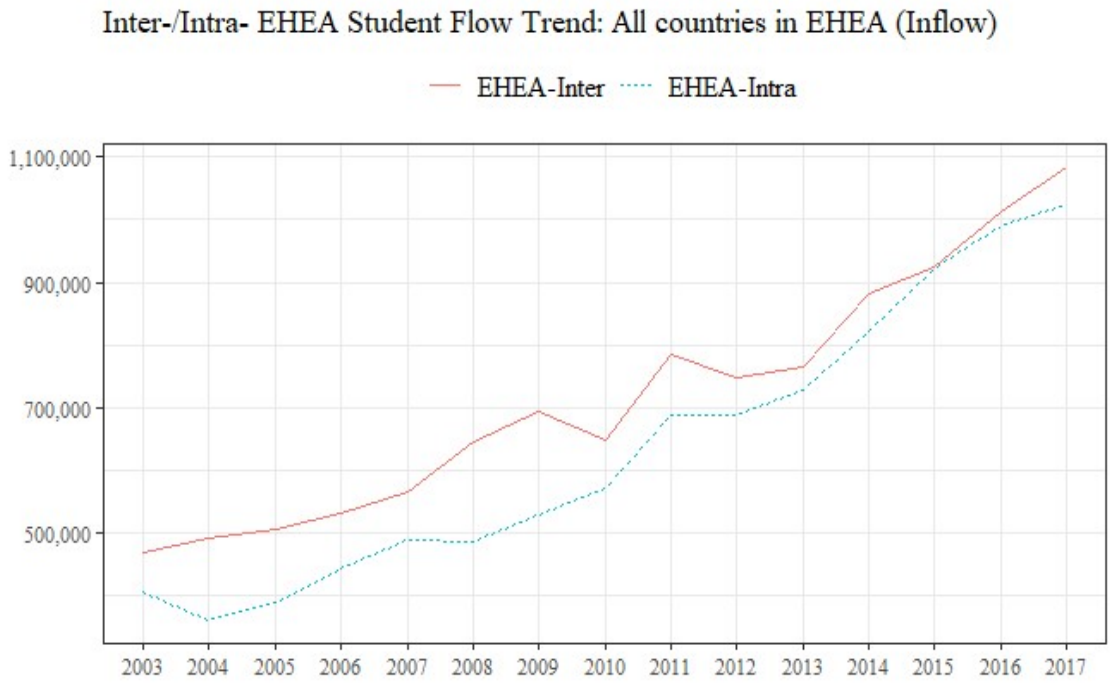
Regional higher education initiatives and international student mobility. Two regions require further investigation: Europe and Southeast Asia. In these regions, inter-governmental higher education policy and initiatives are more active than in other regions. Both regions have been aiming to harmonize higher education systems, promoting student mobility in the region and also attracting students from outside the region through their recognized brand and improved quality. Both regions' higher education integration efforts have been cited as good examples of regionalization (Chou & Ravinet, 2017; de Prado Yepes, 2007). Their regional mobility initiatives, the ERASMUS Program and Bologna Process in Europe, and the ASEAN International Mobility for Students (AIMS) program in South Asia, are a part of their regionalization efforts. In this section, trends in inter- and intra-region student flow in both regions are further examined.

First, for Europe, the Bologna process was launched in 1999 by 29 EU member countries to promote inter-governmental cooperation and bring coherence to higher education systems in the region. It has since expanded to 49 European countries. It entails a series of educational reforms and regional level initiatives that can help harmonize the higher education system across countries in the region. In 2010, the European Higher Education Area (EHEA) was formally established to enhance "comparability and compatibility of European higher educations" (Vogtle & Windzio, 2016, p. 1). One of the main goals of the Bologna process and EHEA is to facilitate intra-regional student mobility and, to that end, relevant policies and programs were implemented (Rivza & Teichler, 2007).

To examine changes resulting from regionalization efforts in Europe, trend line graphs are presented in Figures 8-1 and 8-2, which show changes in inter-/intra-EHEA flow between 2003 and 2017.

As Figure 8 shows, both inter- and intra-EHEA inflow have increased. During the period, intra-EHEA inflow grew by 614,474, and inter-region has increased by 618,475. These results align with recent EHEA reports stating that the inflow of non-EHEA students seeking foreign degrees in EHEA member countries has grown along with the growth in mobility between EHEA member countries (European Commission et al., 2018). These findings could imply that the EHEA regional policies were effective in attracting both inter- and intra-region students. Looking into details, however, not all nations experienced growth and there are gaps between nations. The EHEA reports also noted this "imbalance" of regional mobility. (Ferencz, 2015; European Commission et al., 2018; Kotsi & Agiomirgianakis, 2013; Rivza and Teichler, 2007). For instance, intra-regional inflow did not change during the covered years for most nations in the region except a few leading countries such as U.K., France, Germany, and Austria.

On the other hand, international student outflow to EHEA countries grew much more than the outflow to non-EHEA countries, with a difference of 581,399 students. At the country level, intra-regional outflow increased for several nations including Albania, Azerbaijan, Bulgaria, Germany, and East European countries. These results mean that more EHEA students remained in the same region, but their destinations were concentrated in the traditionally popular destination countries.



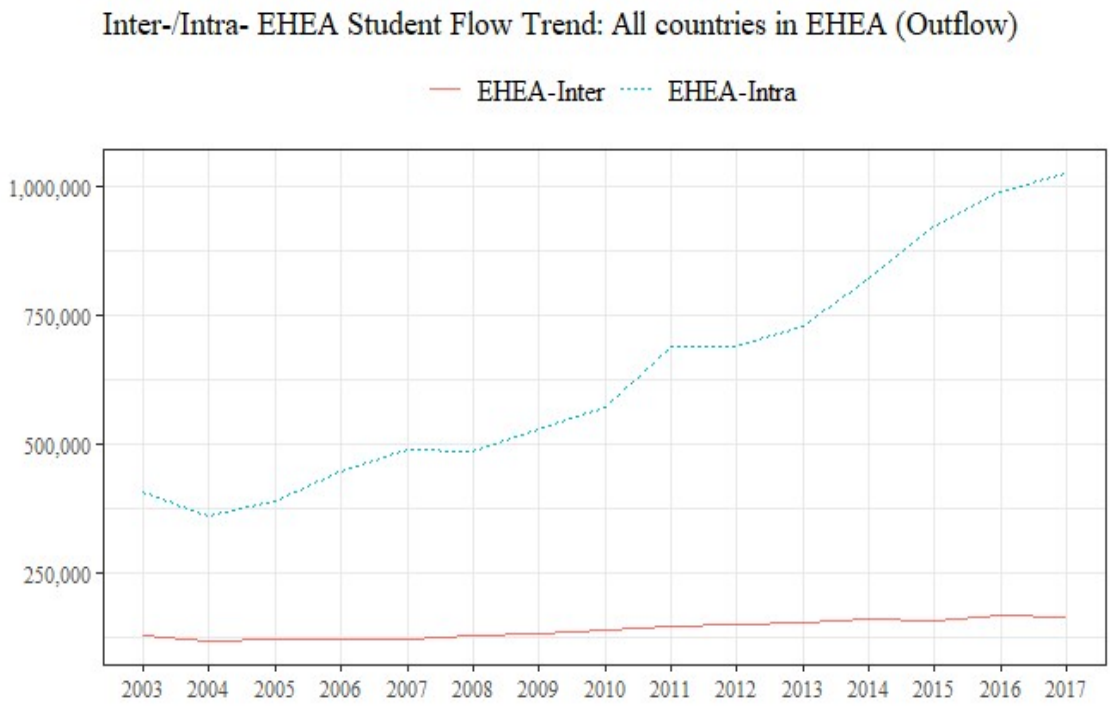


Figure 9 Intra-/Inter- EHEA Student Flow Trend

Next, Figures in 9 through 12 focus on new EHEA members in 2003 and 2005 to see whether their membership changed any intra-/inter-regional flow trends. Table 11 shows the growth comparison for the new EHEA members since 2005. For the countries that joined in 2003 or 2005, international student inflow in most countries, except Russia and Ukraine, did not grow significantly after joining EHEA. On the other hand, the number of students going to EHEA member countries for a college degree has increased much more than the number going to non-EHEA countries. This could be due to a regional policy that has reduced the cost of tuition and fees for the EHEA member nation students. The policy can be more effective for relatively less developed and lower-income countries where high-quality education is limited, and people seek better income opportunities in more developed countries in the region.

As figure 9 and 10 only show a rough trend based on the flow numbers in EHEA countries, more research is required to test whether EHEA policies have influenced the level of intra-EHEA flow for the countries and how it has done so. More importantly, the trend graphs do not show changes in the short-term mobility measures that the ERASMUS program is targeting. According to reports and statistics, the proportion of European students who engaged in a short period study-abroad program (e.g., credit mobility) increased (Rivza & Teichler, 2007).

Table 11 Inter-/Intra- EHEA Flow Growth for New EHEA Member Countries in 2005

Members since 2005	**Growth in Inflows (2006-2017)**			**Growth in Outflow (2006-2017)**		
	EHEA	Else	Net EHEA Growth	EHEA	Else	Net EHEA Growth
Armenia	672	-741	1,413	2,547	-118	2,665
Azerbaijan	-146	806	-952	38,040	454	37,586
Georgia	3,289	4,365	-1,076	6,649	250	6,398
Moldova	490	1,538	-1,048	9,919	-194	10,113
Ukraine	11,092	18,944	-7,852	57,232	1,229	56,003

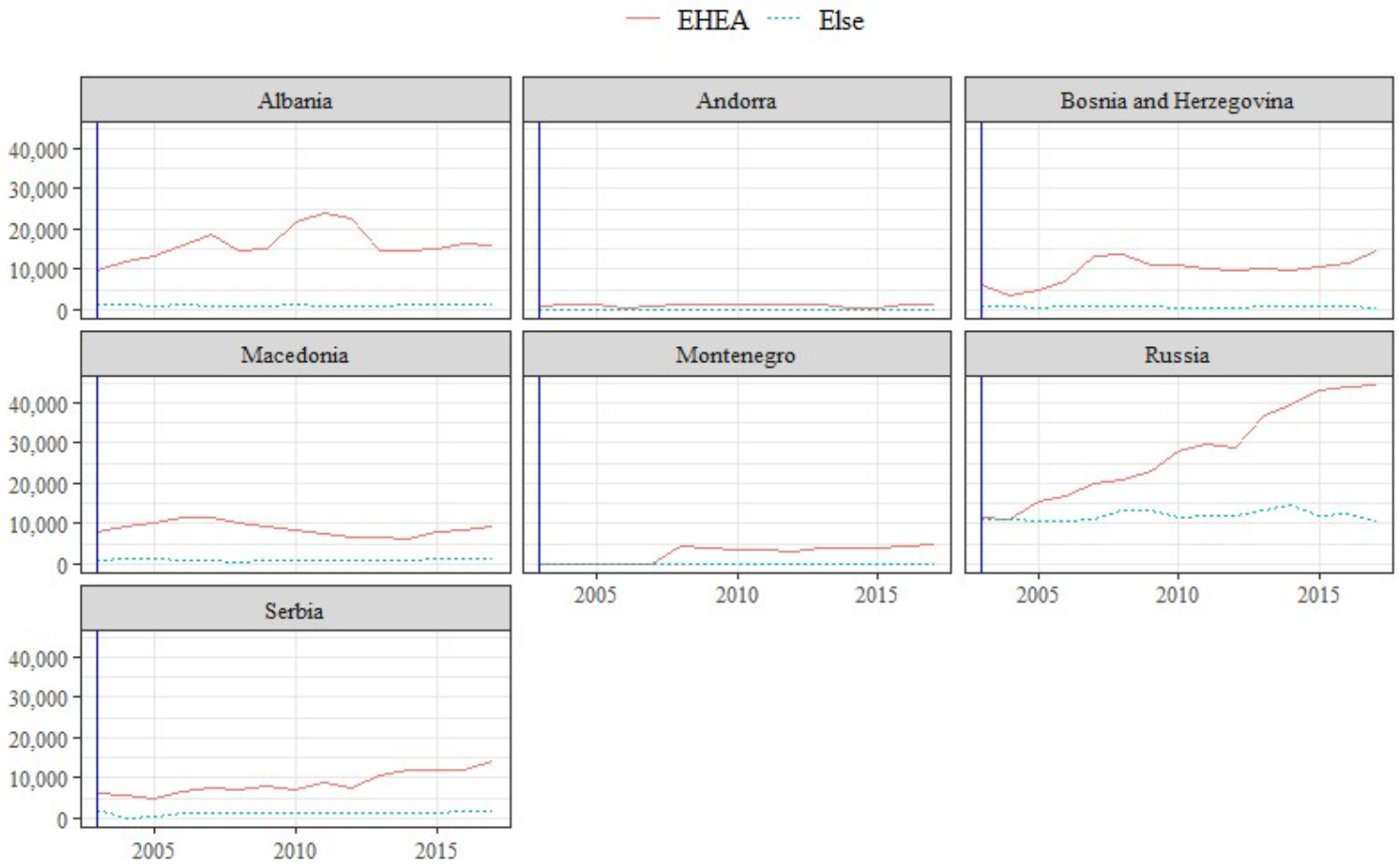


Figure 10 Intra-/Inter- EHEA Outflow for New EHEA Member Countries in 2003

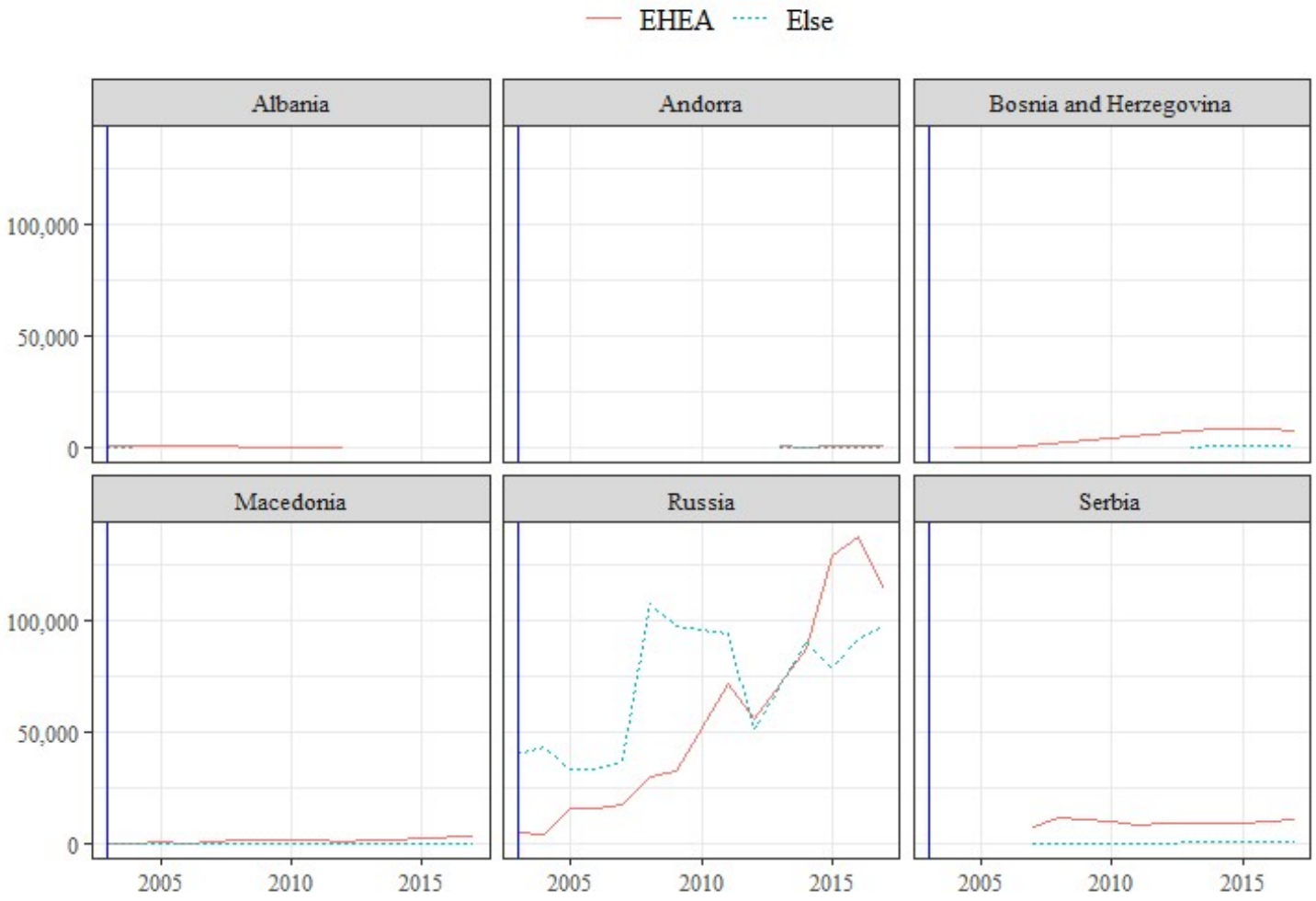


Figure 11 Intra-/Inter- EHEA Inflow for New EHEA Member Countries in 2003

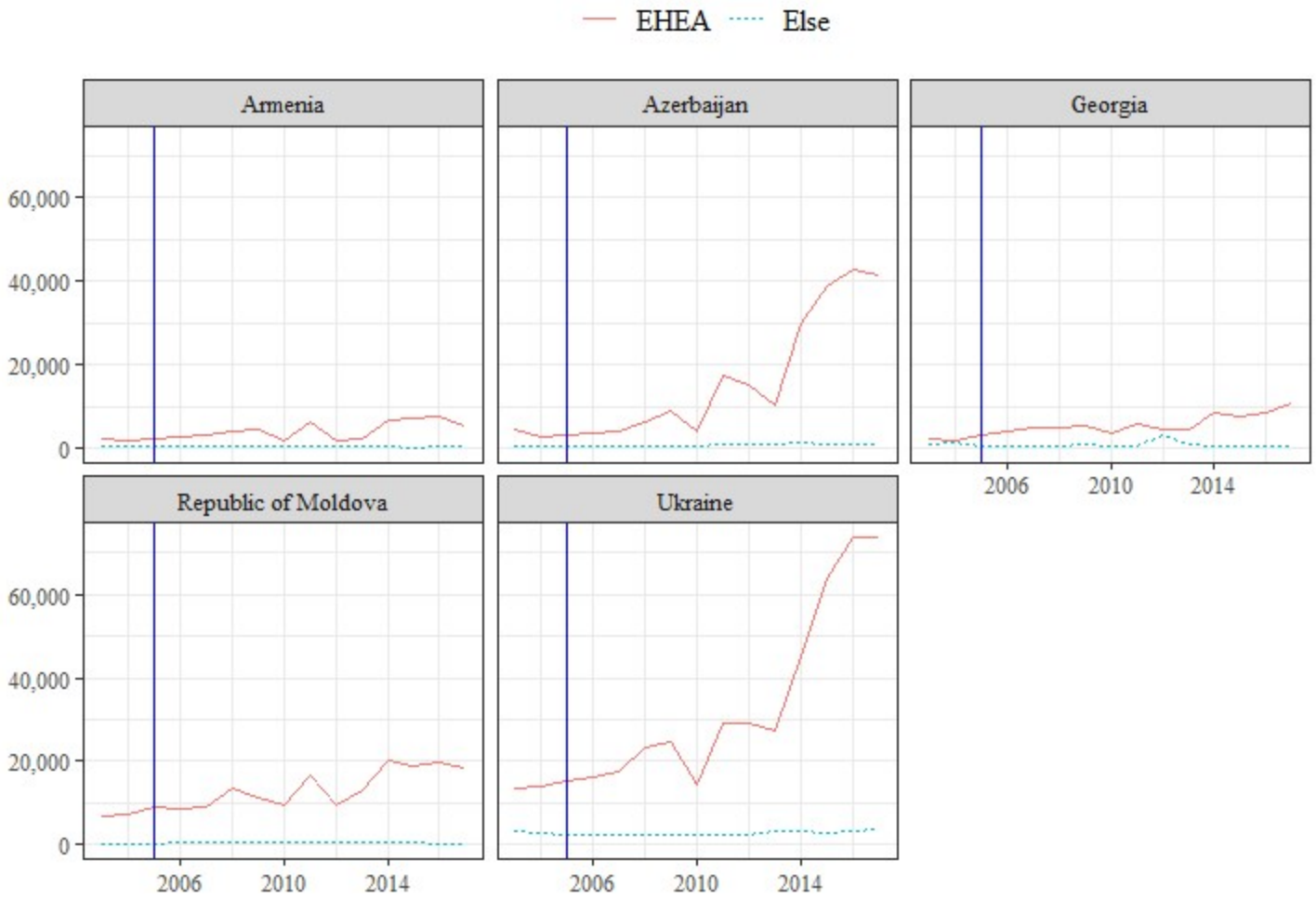


Figure 12 Intra-/Inter- EHEA Outflow for New EHEA Member Countries in 2005

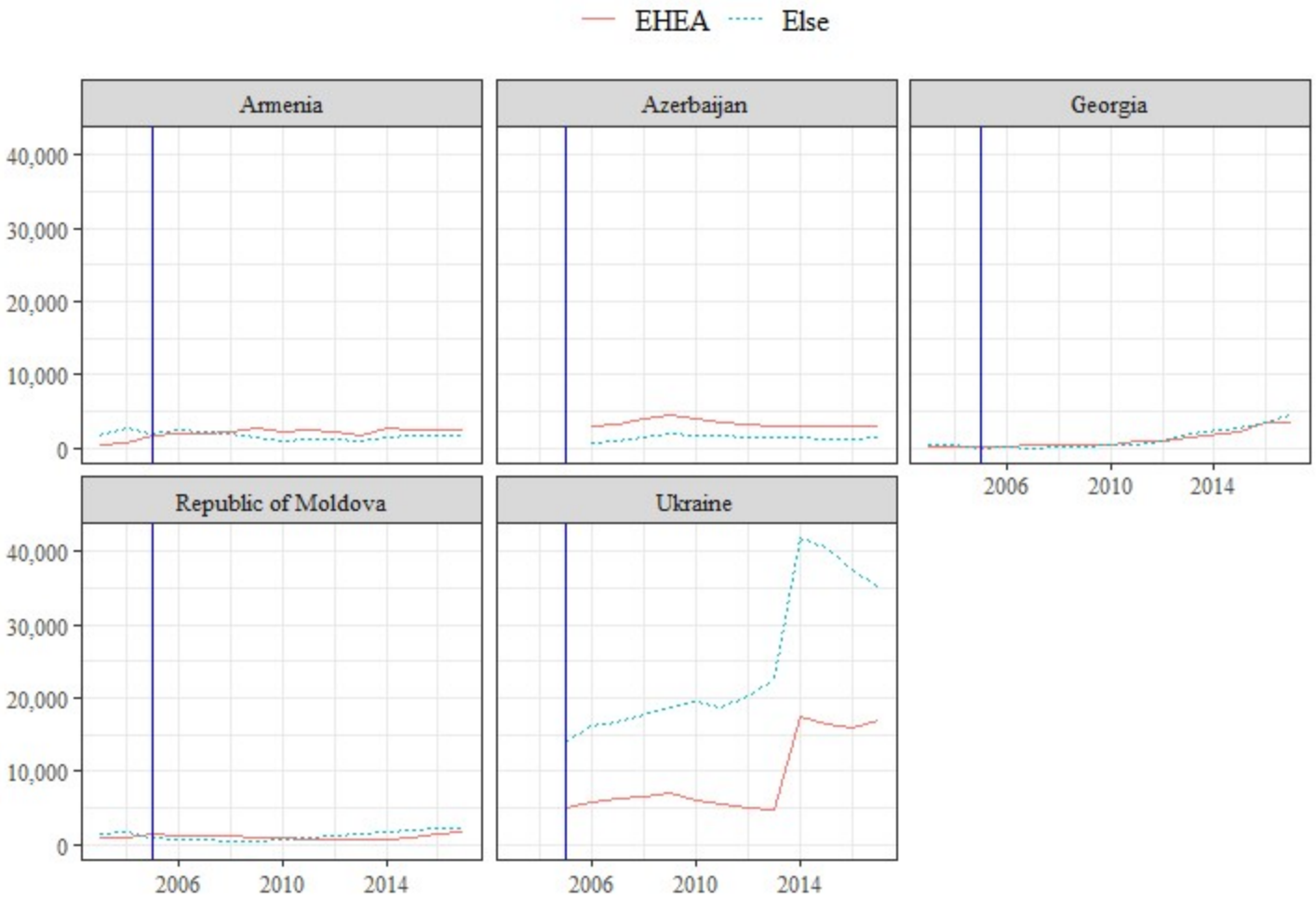


Figure 13 Intra-/Inter- EHEA Inflow for New EHEA Member Countries in 2005

Southeast Asia is another region that has an intergovernmental organization promoting regional development through harmonized and coordinated higher education systems. Their intergovernmental organization, the Southeast Asian Ministers of Education Organization (SEAMEO), established the Regional Institute of Higher Education and Development (RIHED) in 1993 and has implemented initiatives to boost intra-regional flow and develop a coordinated higher education system. The pilot project for the ASEAN International Mobility for Students (AIMS) program was launched in three leading countries in 2009 and expanded to other SEAMEO member countries in 2012 (McDermott, 2019).

To examine whether their regional effort resulted in the growth of international student mobility, inter- and intra-regional flow changes were analyzed. Intra-regional flow here refers to international student flow between SEAMEO member countries while inter-region flow refers to flow from/to non-SEAMEO member countries. Figures 11-1 and 11-2 show intra- and inter-regional flow trend for the SEAMEO member nations.

According to the graphs in figure 11-1, the number of international students from SEAMEO countries pursuing their college degrees in non-SEAMEO countries has increased since 2006 except for the years 2010 and 2012. The number of students who chose the other SEAMEO countries has not increased much during the same period. The most popular destinations for students in SEAMEO countries were Australia, U.S., United Kingdom, and Japan. In a similar way, the number of international students from non-SEAMEO countries has increased at rapid rates except for a few years between 2011 and 2013. The number of international students from the other SEAMEO countries has increased at much slower rates. The sudden drop in year 2013 is due to missing data for the countries in the region. The UNESCO

estimates for the region show a decrease in 2012 only, which can be associated with the region-wide natural disasters (figure 11-2).

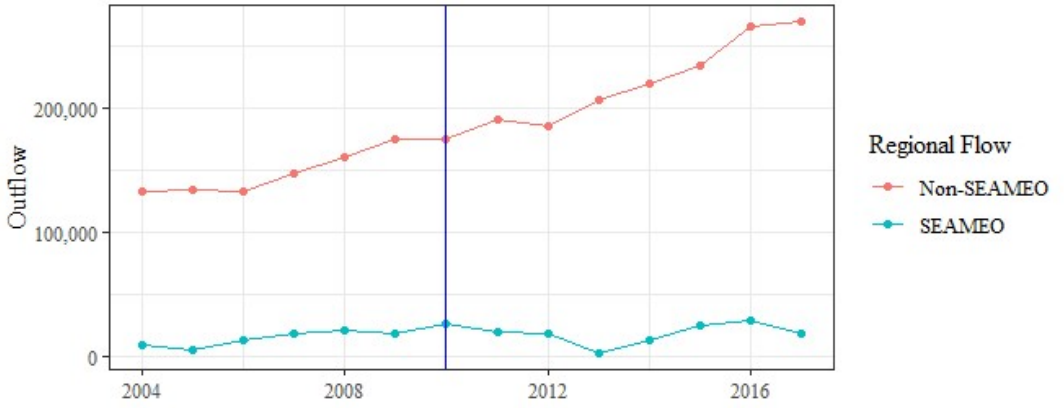


Figure 11-1) Inter/Intra Region Student Flow Trend (SEAMEO): Outflow

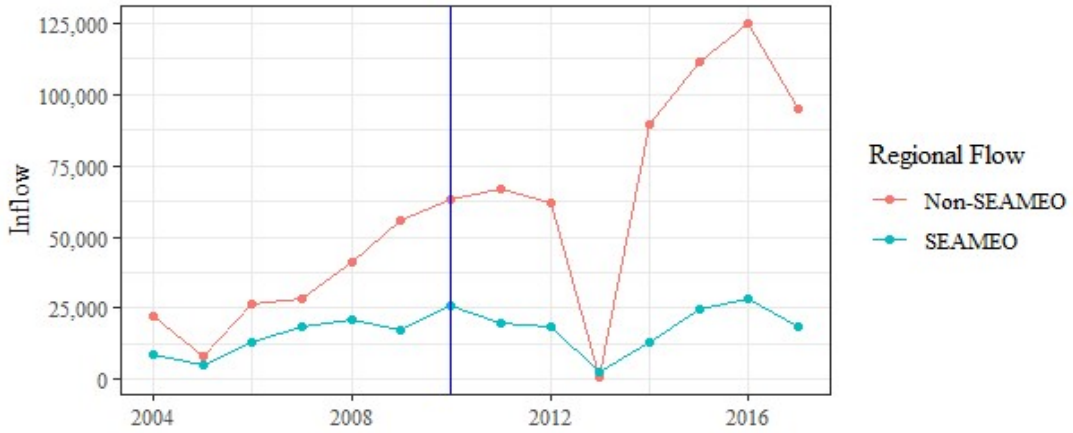


Figure 11-2) Inter/intra Region Student Flow Trend (SEAMEO): Inflow

The next two graphs in figure 12 show intra- and inter-SEAMEO flow trends for three leading nations in SEAMEO, Malaysia, Indonesia, and Thailand. The graphs show similar patterns to those in figure 11 in that both inter-regional inflow and outflow have increased. However, the inter-regional inflow growth is concentrated in Malaysia, whereas all three countries show growth in inter-regional outflow.

To summarize, even with ASEAN's regional initiatives in international student mobility, intra-regional mobility has not increased significantly and the growth that did occur was concentrated in a few countries, primarily Malaysia. The main challenges of ASEAN countries for regional student mobility include their limited higher education infrastructure and diverse education systems that make the region less attractive and more difficult to coordinate (Khalid et al., 2019; Ramburuth & McCormick, 2001).

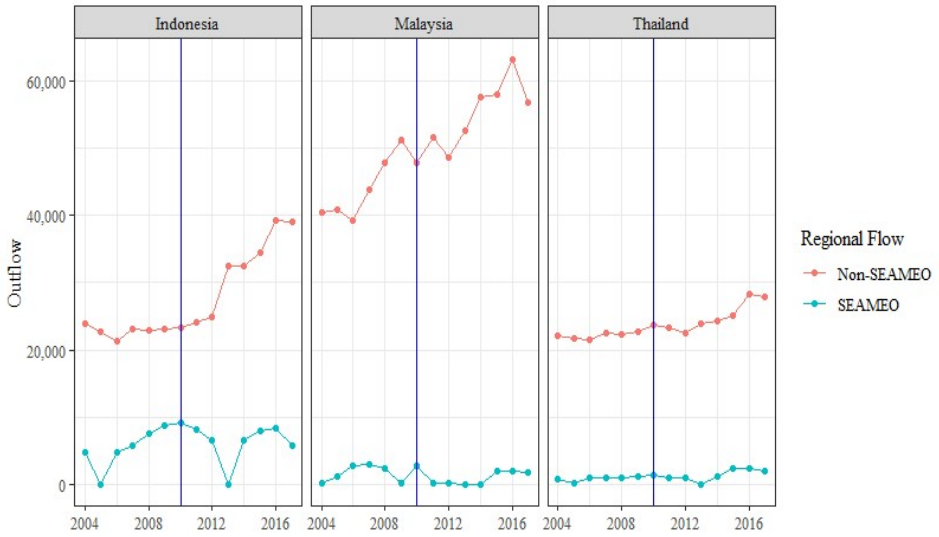


Figure 12-1) Inter-/Intra- SEAMEO Flow in Malaysia, Indonesia, and Thailand: Outflow

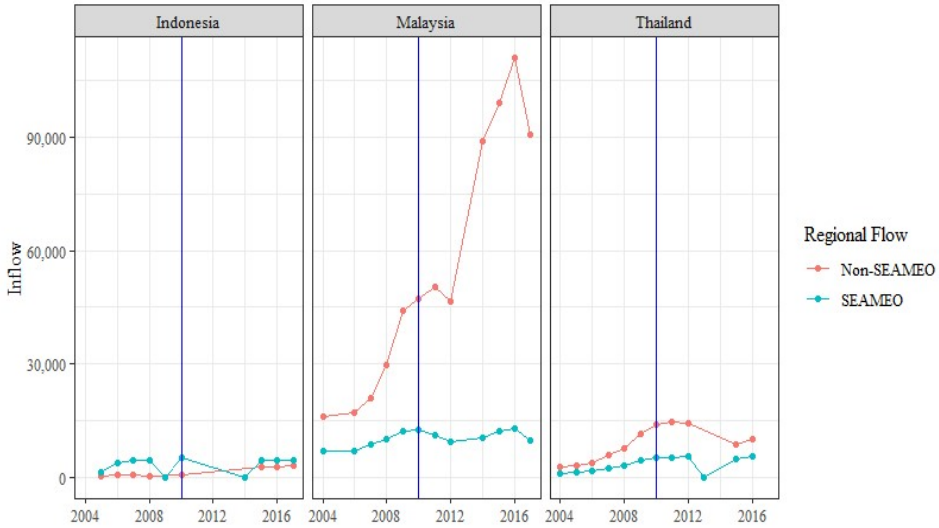


Figure 12-2) Inter-/Intra- SEAMEO Flow in Malaysia, Indonesia, and Thailand: Inflow

Both regions show that there has been an overall increase in student mobility, but there are continuing imbalances in student flow across member nations. More students went abroad, but the destinations were concentrated on developed nations in the region (Europe's case) or outside the region (Southeast Asia's case). Their regional initiatives may induce more students into the region for short-term mobility such as credit mobility or other forms of short-term education. However, for degree mobility, which requires more time and financial investment, students seem to prefer destinations with a reputation in higher education, as their degrees may be better recognized in the labor market. In addition, for students who consider employment in the destination country after acquiring a degree, their preference naturally leans toward more developed nations where wage levels are higher according to the labor migration theory. Based on the trend graph in both regions, regional initiatives may encourage more students to study abroad, but other educational and economic factors may have a greater influence on students' decisions about where to go.

Another factor to consider for Southeast Asian countries is that there are other inter-regional initiatives with Europe and three East Asian countries (Japan, China, and South Korea) ongoing, which include more economically developed nations with better infrastructure and quality in higher education. These inter-regional initiatives could offset some of the intra-regional efforts to keep students in the region. Furthermore, insufficient funding to develop regional initiates and the lack of a regulatory body that can coordinate differences between higher education systems and implement more coherent policies in the Southeast Asia region also contributed to the limited success of the mobility programs (Atherton et al., 2021; Chao, 2020; Hou et al., 2017).

However, there still exist potential benefits and opportunities from collaborations between institutions, countries, and other stakeholders in the region. For instance, various networks between higher education stakeholders in the region have been established, which can serve as possible routes to reach international students through multiple channels. Also, continued discussions on harmonization of higher education systems show signs of more institutionalized cooperation opportunities.

International student mobility at the country level. The final part of the flow trend summary is at the country level. In this section, a list of countries showing the greatest growth or decline over time and top origin/destination countries are explored. Then, national characteristics that could be relevant to the flow trend are discussed with correlation measures. Furthermore, how bilateral student mobility measures can be compared to other relevant flows such as bilateral migrant stock and trade are examined.

Tables 12 and 13 show the top 10 sending and receiving countries in 2005, 2010, and 2015. For outbound students, China sent the most students throughout the years accounting for almost 17% of the total outflow in 2015. China's outflow increased between 1999 and 2017 although its growth has stabilized since 2003 with its peak growth rate of 26%. India followed China's lead in outflow taking 5% of the total market share in both 2005 and 2015. The share from Japan and Greece sharply declined beginning in 1999 while Korea's share started to decline in the late 2000s.

For international student inflow, traditionally popular destinations, either English-speaking nations or wealthy European countries, have remained at the top. However, market shares for Australia, the USA, and major European nations have decreased over

Table 12 *Top 10 Outflow Countries in Year 2005,2010, and 2015*

	Year 2005			Year 2010			Year 2015		
Rank	**Country**	**Outflow**	**Market Share**	**Country**	**Outflow**	**Market Share**	**Country**	**Outflow**	**Market Share**
1	China	396,477	14%	China	567,984	15%	China	819,855	17%
2	India	147,428	5%	India	210,817	6%	India	257,006	5%
3	South Korea	99,044	4%	South Korea	126,194	3%	Germany	117,098	2%
4	Germany	64,365	2%	Germany	105,110	3%	South Korea	107,857	2%
5	Japan	63,492	2%	USA	67,165	2%	Nigeria	92,548	2%
6	USA	57,767	2%	Malaysia	59,450	2%	France	86,684	2%
7	France	48,527	2%	France	57,430	2%	Saudi Arabia	86,245	2%
8	Malaysia	47,499	2%	Nigeria	52,433	1%	USA	80,560	2%
9	Canada	43,521	2%	Russia	49,658	1%	Kazakhstan	78,259	2%
10	Morocco	40,997	1%	Vietnam	46,832	1%	Ukraine	68,209	1%

Table 13 Top 10 Inflow Nations in Year 2005, 2010, and 2015

	Year 2005			Year 2010			Year 2015		
Rank	**Country**	**Inflow**	**Market Share**	**Country**	**Inflow**	**Market Share**	**Country**	**Inflow**	**Market Share**
1	USA	590,158	21%	USA	684,807	18%	USA	907,251	19%
2	UK	318,399	11%	UK	389,958	10%	UK	430,833	9%
3	France	236,518	8%	Australia	271,231	7%	Australia	294,438	6%
4	Germany	207,994	7%	France	259,935	7%	France	239,409	5%
5	Australia	177,034	6%	Germany	201,844	5%	Germany	228,756	5%
6	Japan	125,917	4%	Russia	154,426	4%	Russia	226,431	5%
7	Russia	90,450	3%	Japan	141,599	4%	Canada	171,603	4%
8	Canada	69,126	2%	Canada	106,284	3%	Japan	131,980	3%
9	South Africa	50,129	2%	China	71,673	2%	China	123,127	3%
10	Italy	44,921	2%	Italy	69,905	2%	Malaysia	111,443	2%

the years, indicating that new destinations are emerging and gaining popularity such as Russia, China, and Malaysia.

Tables 14 and 15 show further information about what countries experienced the biggest growth in international student flow between 2006 and 2017. Even though traditionally popular destinations (the USA and Australia) have grown most in terms of the number of inbound international students, the growth rate is slower than the other top 10 countries except for the U.K. Among them, China, Turkey, Malaysia, and Saudi Arabia, four developing nations, show both significant growth and rapidly increasing rates. Even though many factors could have contributed to their remarkable growth, there is one common factor: the strategic involvement of national governments in international higher education such as the National Program for Education Development in Russia and the National Higher Education Strategic Plan in Malaysia (Block & Khvatova, 2016; Chin, 2019; Li, 2016; Wu & Chan, 2019).

Table 14 Top Growing Countries in International Student Inflow

Rank	Country	2006	2017	Growth	CAGR
1	United States of America	584,719	984,898	400,179	4.9%
2	Australia	184,710	381,202	196,492	6.8%
3	Russian Federation	77,438	250,658	173,220	11.3%
4	Canada	68,520	209,979	141,459	10.7%
5	China	36,386	157,108	120,722	14.2%
6	United Kingdom of Great Britain and Northern Ireland	330,078	435,734	105,656	2.6%
7	Turkey	19,079	108,076	88,997	17.1%
8	Malaysia	24,404	100,765	76,361	13.8%
9	Netherlands	27,037	96,289	69,252	12.2%
10	Saudi Arabia	13,687	78,344	64,657	17.2%

National governments in these countries placed a priority on higher education to transform their economy into a knowledge-based economy and invested in human capital for economic development (Allan et al., 2020; Chin, 2019; Grapragasem et al., 2014). They

implemented educational reform policies with the internationalization of higher education as one of the key pillars. Their plans included enhancing the quality of higher education and increasing the number of international students studying in their countries. To encourage domestic students to study abroad in selective universities and attract foreign students to their countries, national governments provided scholarships for domestic and foreign students. China's Silk Road Scholarship Program and the King Abdullah Scholarship Program (KASP) in Saudi Arabia are good examples.

National governments' strategic policies were coupled with increasing demand for higher education in neighboring countries, mostly developing or underdeveloped nations with limited capacity in higher education and/or a large youth population. Compared to developed nations, new emerging actors in higher education can provide international higher education at a lower cost. Cultural similarity and geographical proximity are additional advantages for students in neighboring countries (Sawahel, 2015; UNESCO, 2014). Accordingly, the emerging actors from developing nations were able to expand their market share mainly from neighboring countries (Allahmorad & Zreik, 2020; Chin, 2019; Kondakci et al., 2016). In sum, the growth of new emerging actors in the global higher education market could be attributed to both national governments' strategic policies and the increasing demand for higher education in neighboring countries.

Table 15 shows that the three countries with the biggest growth in international student outflow are in Asia. Also, five out of the top 10 countries are in Asia, which reflects the fast-growing demand for international higher education in Asia. China grew the most with a compound annual growth rate of over 10%. India follows China with a substantial gap between

them and the remaining countries. Saudi Arabia also stands out showing significant growth both in inflow and outflow.

Table 15 Top Growing Countries in International Student Outflow

Rank	Country	2006	2017	Growth	CAGR
1	China	137,622	928,365	790,743	11.2%
2	India	60,164	341,442	281,278	10.1%
3	Viet Nam	8,080	94,621	86,541	14.6%
4	Saudi Arabia	10,464	84,246	73,782	12.3%
5	Germany	53,379	122,961	69,582	4.7%
6	Kazakhstan	20,525	84,852	64,327	8.2%
7	Nigeria	22,464	85,925	63,461	7.7%
8	Ukraine	16,473	77,878	61,405	9.0%
9	Nepal	4,444	64,288	59,844	16.0%
10	Bangladesh	8,050	57,916	49,866	11.6%

Figures 13 and 14 show how nations were positioned in terms of their market share in 2015 and compound annual growth rates between 2005 and 2015. In both inflow and outflow, two strong actors, the U.S. and U.K. for inflow and China and India for outflow took dominant positions taking around or above one-fourth of the market. However, the compound annual growth rates show that there are growing and declining actors over time. For instance, the second-tier nations gained more inflow market share over time with high annual growth rates such as a few Asian nations including China and Malaysia. On the other hand, a few European countries lost their inflow market share with relatively slow growth rates (e.g., France and Germany). In the outflow market, many Asian countries show fast growth rates. Even with these changes, both inflow and outflow markets have many peripheral countries without much change, having 0 inflow and/or outflow.

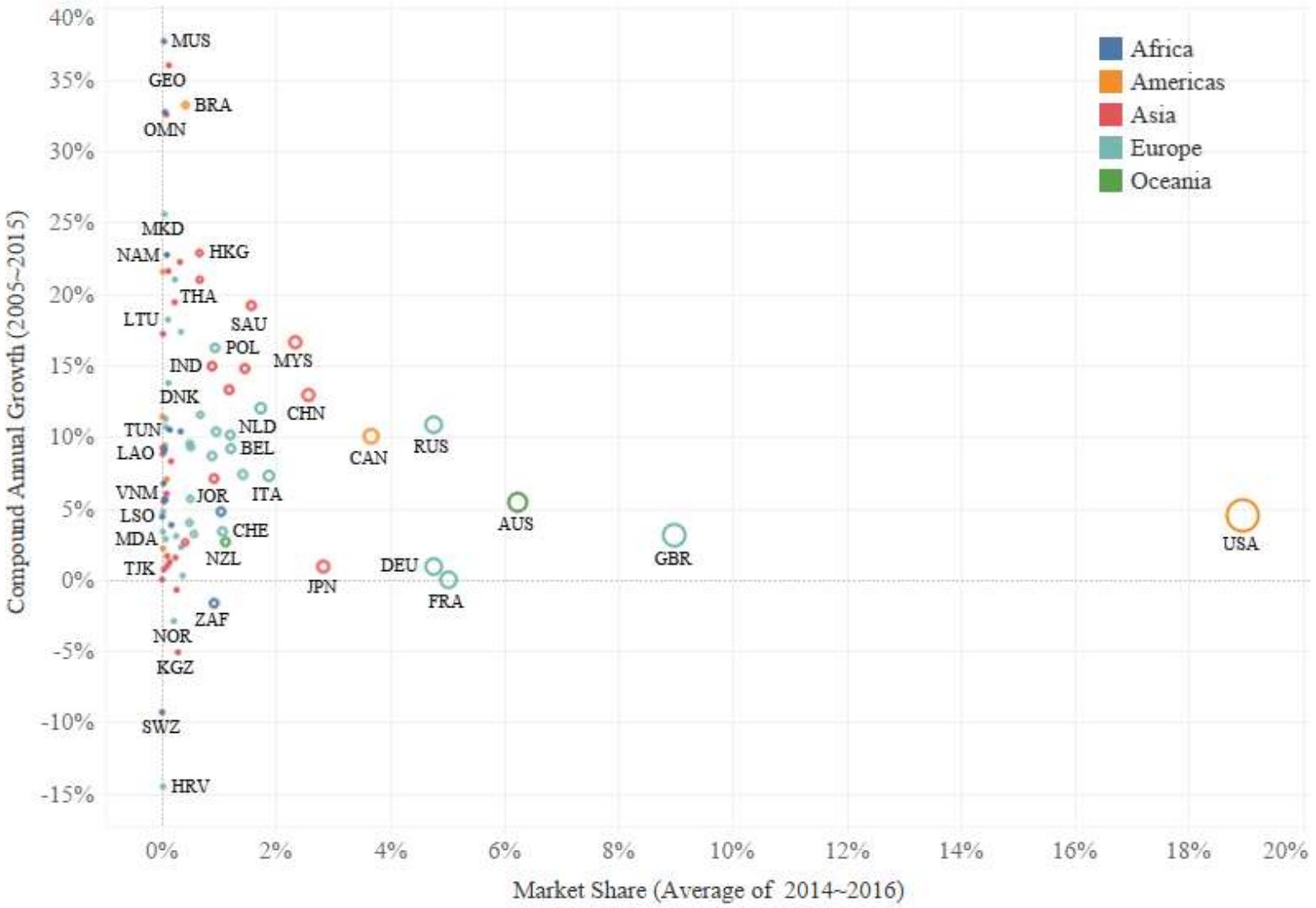


Figure 14 International Student Inflow Market (Compound Annual Growth Rate and Market Share)

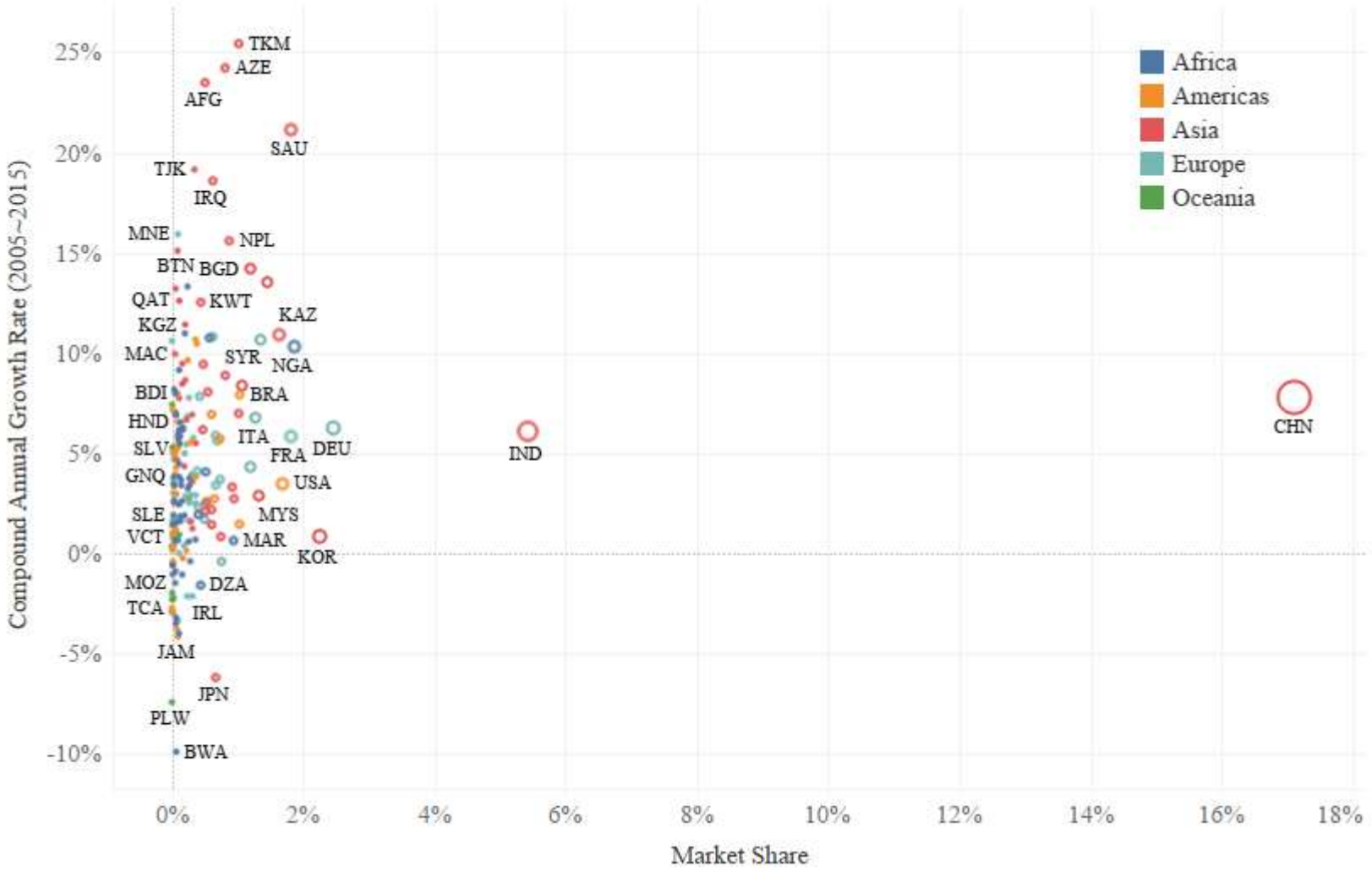


Figure 15 International Student Outflow Market (Compound Annual Growth Rate and Market Share)

The next part covers 1) how international student flows are correlated with national characteristics of sending or receiving countries, and 2) whether student flow measures show similarities to other relevant bilateral flow, specifically international migration and trade. Tables 16 through 20 display pairwise correlation coefficients between international student flow and possible explanatory variables in groups. The groups include economic, education, demographic, government, and global involvement measures. As the number of inbound and outbound international students were not scaled by the size of a country, some correlations can be driven by the size of their country, total population.

First, a group of economic variables was examined. According to results presented in Table 16, GDP (adjusted to purchasing power parity) is highly correlated with both outflow and inflow. This data indicates that the economic development of nations is positively related to international student flow. Higher levels in GNI per capita and annual wages in OECD nations are moderately correlated with more international student inflow. In addition, higher global competitiveness index (GCI) scores are positively related to the volume of international students. Correlations between student flow and remaining variables are relatively weak.

Table 16 Correlations between International Student Flow and Economic Variables

	Inflow (Log)	Outflow (Log)	GDP (Log)	GNI per capita (Log)	Annual Wage: OECD (Log)	PPP (Log)	GDP Growth	Unemployment
Inflow (Log)								
Outflow (Log)	0.61***							
GDP (Log)	0.79***	0.85***						
GNI per capita (Log)	0.44***	0.23***	0.42***					
Annual Wage :OECD (Log)	0.51***	0.20***	0.30***	0.89***				

PPP (Log)	0.34***	-0.06***	0.03	0.55***	0.84***			
GDP Growth	-0.11***	0.04*	0.03	-0.09***	-0.14***	-0.20***		
Unemployment	-0.16***	0	-0.10***	0.09***	-0.42***	0	-0.10***	
GCI Score	0.58***	0.35***	0.58***	0.83***	0.76***	0.68***	-0.11***	-0.09***

Next, correlation results between international student flow and educational variables are presented in Table 17. According to the results, the number of students enrolled in tertiary education institutions is strongly correlated with both log-transformed inflows and outflows. This is because tertiary education enrollment can represent both the demand and supply of higher education. On the supply side, it can measure the capacity of higher education in a given country. However, tertiary education enrollment is not a complete measure of the capacity, as it does not show the number of higher education institutions or the number of students these schools can accommodate. More specifically, the availability of academic programs at higher education institutions and the capacities of different programs cannot be captured using this measure. If tertiary education enrollment is a pure measure of a country's capacity for higher education, it would be expected to be positively correlated with international student inflow and negatively associated with international student outflow. However, the positive sign in international student outflow is somewhat explained by the fact that enrollment in tertiary education can also be a demand side factor. Tertiary education enrollment also indicates the demand for higher education in a given country. A large enrollment could also be due to the size of the country's population. If it is a pure measure of demand, high demand and low capacity of higher education institutions could serve as positive push factors. In short, the relationship between tertiary education enrollment and international student flows is not clear-cut; instead, this requires further studies of what these indicators capture and how we can better use them as indicators in empirical studies. Other education factors, global ranking measures and the Global Competitive Index (GCI) in

higher education are moderately correlated with inflow, as predicted by the human capital theory.

Table 17 Correlation between International Student Flow and Educational Variables

	Inflow (Log)	Outflow (Log)	Enrollment in Tertiary Education	Gross Enrollment Ratio (Tertiary Education)	Pupil-Teacher Ratio (Log)	GCI in Higher Education
Inflow (Log)						
Outflow (Log)	0.61***					
Enrollment in Tertiary Education	0.71***	0.82***				
Gross Enrollment Ratio (Tertiary Education)	0.56***	0.34***	0.49***			
Pupil-Teacher Ratio (Log)	0.08**	0.27***	0.32***	-0.06*		
GCI in Higher Education	0.55***	0.28***	0.24***	0.83***	-0.34***	
Global Rankings (ARWU & QS)	0.57***	0.37***	0.39***	0.34**	-0.12*	0.57***

For demographic variables, population indicators (college-age population and total population) are strongly correlated with log outflow and moderately correlated with inflow. As the college-age population and total population are highly correlated, this study will use the college-age population only.

Table 18 Correlations between International Student Flow and Demographic Variables

	Inflow (Log)	Outflow (Log)	Population Density (Log)	Population (Log)
Inflow (Log)				
Outflow (Log)	0.61***			
Population Density (Log)	-0.04	-0.07***		
Population (Log)	0.61***	0.81***	-0.17***	
College-Age Population (Log)	0.54***	0.80***	-0.15***	1.00***

Table 19 presents correlations between government or political variables and international student flow. In general, they are weakly correlated with flow measures while World Bank Governance Indicators (WGI) are strongly correlated with each other. For this study, only political stability scores are used in push models due to many missing values in government expenditure data and possible multicollinearity issues between governance indicators.

Table 19 Correlations between International Student Flow and Government Variables

	Inflow (Log)	Outflow (Log)	Government Expenditure on Higher Education (% of GDP)	Corruption	Political Stability
Inflow (Log)					
Outflow (Log)	0.61***				
Government Expenditure on Higher Education (% of GDP)	0.33***	0.16***			
Corruption	0.32***	0.02	0.47***		
Political Stability	0.16***	-0.26***	0.34***	0.73***	
Government Effectiveness	0.42***	0.17***	0.44***	0.93***	0.69***

The final set of group variables are global flow and network variables such as international trade, migrants, and intergovernmental organizations. As Table 20 presents, the number of international migrant stock and the volume of international trade are strongly correlated with both inflow and outflow. Correlations between the number of intergovernmental organizations and international student flow are also relatively strong. Other international trade variables (trade as a proportion of GDP and the number of bilateral trade agreements) are weakly correlated.

Table 20 Correlations between International Student Flow and Global Measures

	Inflow (Log)	Outflow (Log)	Migrant Stock	Trade (% of GDP)	Trade (Log)	Total Number of RTA (Log)
Inflow (Log)						
Outflow (Log)	0.61***					
Migrant Stock (5 years lagged)	0.72***	0.73***				
Trade (% of GDP)	-0.13***	-0.18***	-0.16***			
Trade (Log)	0.79***	0.81***	0.78***	0.03*		
Total Number of RTA (Log)	0.23***	0.28***	0.19***	0.03	0.29***	
Total Number of IGOs (Log)	0.67***	0.68***	0.64***	-0.20***	0.71***	0.41***

In addition, correlations between three international flow measures, 1) international students, 2) the volume of international trade, and 3) migrants are further examined. Previous empirical literature found that these flows are interconnected and influence each other. For instance, Dreher and Poutvaara (2005) found that the stock of foreign students in the destination country induces subsequent migration. Felbermayr and Reczkowski (2012) further confirmed the positive relations between international student mobility and high-skilled migrants. Also, many migration studies discovered interdependence between international trade and migration (Baltagi et al., 2014; Felbermayr et al, 2015; Genc et al., 2012; Hatzigeorgiou, 2010; Vezina, 2010). International migration studies based on world system theories, particularly mentions that economic hegemony is reflected in different types of international flow (Barnett et al., 2016; Barnett & Wu, 1995; Chen & Barnett, 2000; Kondakci et al., 2017; Morawska & Martiniello, 2012; Macrander, 2017; Mulvey, 2021; Restaino et al., 2020; Shields, 2012; Vogtle & Windzio, 2016).

To examine the relationship between international student flows and other global flow measures, this study tested correlations between three bilateral flows. In this context, "bilateral flows" refers to international trade, migration, or student flows between a pair of countries. For instance, the bilateral student flow between China and Canada would refer to the number of

students exchanged between these two countries. Table 21 shows a result of correlation tests between international students, migration, and trade flow for all years while Table 22 represents correlations for the years 2005, 2010, and 2015. According to the results, international student flow, migration stocks, and trade flow are moderately and positively correlated (Table 21). Also, as Table 22 shows, correlations have become stronger in recent years.

Table 21 Correlations between Bilateral Flow Measures

	Bilateral Student Flow	Bilateral Trade
Bilateral Student Flow		
Bilateral Trade	0.47***	
Bilateral Migrant Stock	0.45***	0.44***

Table 22 Correlations between Bilateral Flow Measures in Year 2005, 2010, and 2015

	2005	2010	2015
Bilateral Student Flows and Bilateral Trade	0.46***	0.48***	0.49***
Bilateral Student Flows and Bilateral Migrant Stock	0.44***	0.46***	0.47***

In summary, certain economic, education, demographic, and global measures are strongly correlated with international student flow. Particularly for global flow variables, there are also modest correlations between different bilateral flows. These results indicate that not only the total volume but also bilateral flow in international trade and migrant stock can explain patterns of international student mobility. In the next section, selected push and pull factors are analyzed with panel data regression estimates.

Push and Pull Models

All these descriptive details provide rough information about how general patterns have changed over time and what factors are related to the overall flow volume and changes. To examine factors related to international students empirically, scholars have designed and

conducted qualitative and quantitative studies. The most common way to model these factors quantitatively has been the push-pull theory (Lam et al, 2011; Li& Bray, 2007; Maringe & Carter, 2007; Mazzarol & Soutar, 2002). Applying the push-pull theory to international student mobility, push factors are the conditions in the home country of international students, which encourage students to leave their home countries to pursue their college degrees. Accordingly, push models include the number of outbound students for each origin country as a dependent variable and push factors as explanatory variables. Pull factors are destination specific factors, which attract international students into hosting countries for their college degrees. The dependent variable for pull models is the number of inbound international students for each hosting country with pull factors as explanatory variables.

Push and pull factors for international student flow have been identified through relevant migration theories, large questionnaire surveys, and in-depth focus group interviews of international students. The results of quantitative studies have shown whether any of the selected factors are statistically significant. In this section, following previous studies, a set of push and pull factors are empirically tested with the panel data regression method. Descriptive statistics for variables in analytic models are listed in Table 23, while data definition, data coverage details, and data sources are listed in the appendix 1.

Table 23 Descriptive Statistics (Unscaled)

Variables	N	Mean	St. Dev.	Min	Median	Max
Dependent Variables						
International Student Inflows	1,731	32,685.90	89,099.3	0	6,442	984,898
International Student Outflows	3,845	15,138.40	43,811.9	8	5,590	928,365
Explanatory Variables (Push and Pull Factors)						
GDP (PPP adjusted)	3,579	403,789,606,529.0	1,438,554,147,241.0	22,533,142	39,138,977,065	18,712,097,152,455
GNI per capita (PPP adjusted)	3,503	15,138.4	18,260.7	410	8,550	132,440
Purchasing Power Parity	3,567	0.6	0.3	0.1	0.5	1.7
*Top 200 higher education institutions: Global Rankings - ARWU	2,845	1.0	6.4	0	0	93
Top 200 higher education institutions: Global Rankings - QS	2,845	0.9	4.5	0	0	62

# of IGO memberships	3,239	63.9	20.6	7	63	130.5
College Age Population	3,531	2,965,111.0	11,668,604.0	124	573,230	130,534,079
Population Density	3,785	393.0	1,888.4	2	78	21,389
Gross Enrollment Ratio (Tertiary Education)	2,308	34.8	26.3	0.1	30.1	131.5
Trade (% of GDP)	3,331	89.3	53.6	0.2	80.1	442.6
Unemployment Rates	3,415	8.0	6.1	0.2	6.4	37.2
Political Stability	3,331	-0.03	1.0	-3.3	0.1	1.8
International Migrant Stock	594	875,002.40	2,839,253.0	183	176,397.50	39,258,293

Tables 24 through 31 show the results of pull models. Pull models for the world were first tested, and then the same models for OECD nations, developed, and developing nations were followed. Each column in the table represents a major variable of interest. The basic models include GDP as a measure of the nation's economic development, GNI per capita, OECD member countries' annual wage level, global rankings as a measure of quality and reputation of higher education institutions, and purchasing power parity as a proxy for the cost of living. The network effect is only tested in the world pull model as the number of sample countries in subgroup analysis is not large enough to test the relationship. Next, the immigration policy variable is added to the basic model to examine whether a change to more favorable policies for high-skilled workers is associated with the volume of international student inflow. Fourth, global engagement models include the number of intergovernmental organization memberships and trade as a proportion of GDP. The last group of pull models includes a higher education variable, the gross enrollment ratio in tertiary education.

Starting with pull model results for all countries, GDP is found to be positively associated with the volume of inbound international students across all five models. It indicates the importance of economic development for nations attracting international students. Also, the number of migrants is positively associated with international student inflow with the highest R-squared value, which confirms a strong network effect. More favorable policies for high-skilled workers are also found to be statistically significant. For global engagement level variables, the IGO membership variable is statistically significant. The IGO membership is a measure of a nation's global governance and involvement. More memberships in intergovernmental organizations can indicate that the country is more globalized, internationally active, and connected with other countries. Connections with other nations through intergovernmental

memberships can facilitate partnership and interactions between them, which can be extended to educational sectors. The result confirms a positive relationship between the number of IGO memberships and the volume of inflow. Tertiary school gross enrollment (the proportion of college-age students enrolled in tertiary education) is also positively related to incoming flow. Higher participation levels in tertiary education are possibly related to the overall educational culture and policy in the receiving nation, which would imply more investment in higher education. Furthermore, tertiary school gross enrollment could indicate the capacity of the country's education system to enroll tertiary students (UNESCO Institute for Statistics, n.d.). More capacity in tertiary education also means that higher education institutions in a country can accommodate more international students. All models required country fixed effects while time effects are only needed in the tertiary enrollment model.

Table 24 World Pull Models

	Dependent variable:				
	Log Inflow				
	Basic	Network	High Skilled Policy	Global Engagement	Tertiary Enrollment
	(1)	(2)	(3)	(4)	(5)
Log (Purchasing Power Parity)	-0.012	0.016	-0.003	-0.007	-0.005
	(0.013)	(0.025)	(0.017)	(0.021)	(0.018)
Log (GNI per capita)	-0.070	0.274*	-0.438	-0.319	-0.092
	(0.447)	(0.154)	(0.741)	(0.376)	(0.484)
Global Rankings	0.011	0.017*	-0.010	-0.003	-0.007
	(0.013)	(0.010)	(0.018)	(0.010)	(0.014)
Log (GDP)	3.730***	1.774***	4.552***	3.764***	1.639
	(0.999)	(0.289)	(1.671)	(0.849)	(1.271)
Log (Migrants)		0.318**			
		(0.133)			

High Skilled Immigration Policy (Raise)	0.024***		
	(0.007)		
Log (Total IGO memberships)		0.659*	
		(0.350)	
Trade (% of GDP)		0.039	
		(0.030)	
Log (Gross Tertiary Enrollment Ratio)			0.158**
			(0.076)
Year 2005			0.015**
			(0.007)
Year 2006			0.007
			(0.009)
Year 2007			0.024**
			(0.011)
Year 2008			0.036**
			(0.014)
Year 2009			0.038**
			(0.017)
Year 2010			0.044***
			(0.015)
Year 2011			0.048***
			(0.015)
Year 2012			0.051***
			(0.017)
Year 2013			0.051***
			(0.018)
Year 2014			0.055***
			(0.020)
Year 2015			0.063***
			(0.020)
Year 2016			0.068***
			(0.021)
Year 2017			0.074***
			(0.022)

Constant		-1.487*** (0.272)			
Fixed effects (Country)	Yes	No	Yes	Yes	Yes
Fixed effects (Year)	No	No	No	No	Yes
Observations	1,146	248	448	880	918
R^2	0.365	0.511	0.338	0.393	0.457
Adjusted R^2	0.306	0.501	0.167	0.326	0.392
F Statistic	150.723*** (df = 4; 1048)	294.407***	36.293*** (df = 5; 355)	85.439*** (df = 6; 791)	38.303*** (df = 18; 820)
Note:					*p**p***p<0.01

The next group of models shows the results of pull factors for OECD member nations. As in the world pull models, GDP, the number of IGO memberships, a change to favorable immigration policies for high-skilled workers, and the gross enrollment ratio in tertiary education are statistically significant. The annual wage level is only significant in the basic and immigration policy model. This result is probably due to the wage and development levels of the OECD countries being already high enough, so other factors contribute more once students choose a destination in developed nations like OECD members.

The main difference between the world pull models and the OECD models lies in the statistical significance of the purchasing power parity variable. In all OECD pull models, the purchasing power parity as a cost-of-living proxy was negatively related to the volume of inflow, which indicates that a cost factor matters when selecting a destination across developed nations. When controlling for economic development level, annual wage level, global rankings, and other factors in the model, less expensive destinations seem to be preferred.

Another difference between the world and OECD pull models is the statistical significance of global ranking measures. The relationship between international student inflow and global ranking measures is negative, which is statistically insignificant in robust standard error models. This could imply that students perceive the quality of higher education in OECD

nations to be better and somewhat guaranteed as most of the top-ranked institutions are from these countries. Both the annual wage level and quality of higher education could be important only up to a certain threshold.

Similar results are shown in pull models for developed nations. The negative relationship between PPP and the volume of international student inflow is statistically significant in some models. More favorable immigration policies for high-skilled workers, GNI per capita (except for the global engagement level model), and GDP are all positively associated with international student inflow. Global rankings are negatively associated with international student inflow, but they are only statistically significant in the tertiary enrollment pull model.

Table 25 OECD Pull Models

	Dependent variable:			
	Log Inflow			
	Basic	High Skilled Policy	Global Engagement	Tertiary Enrollment
	(1)	(2)	(3)	(4)
Log (GDP)	3.332***	2.993***	3.453***	3.937***
	(0.280)	(0.248)	(0.887)	(0.542)
Log (Purchasing Power Parity)	-0.029**	-0.035**	-0.043*	-0.031*
	(0.014)	(0.016)	(0.025)	(0.018)
Log (Annual Wage)	1.096*	1.334***	0.178	0.333
	(0.607)	(0.498)	(0.917)	(0.709)
Global Rankings	-0.010	-0.015	-0.012	-0.018
	(0.009)	(0.010)	(0.009)	(0.013)
High Skilled Immigration Policy (Raise)		0.010*		
		(0.005)		
Log (The number of IGO memberships)			1.164**	
			(0.544)	
Trade (% of GDP)			0.020	
			(0.033)	

Log (Gross Tertiary Enrollment Ratio)				0.251**
				(0.123)
Constant	-3.562***	-3.429***		
	(0.716)	(0.569)		
Fixed effects (Country)	No	No	Yes	Yes
Observations	409	176	345	338
R^2	0.554	0.580	0.526	0.552
Adjusted R^2	0.549	0.567	0.469	0.507
F Statistic	541.517***	266.343***	56.890*** (df = 6; 307)	75.386*** (df = 5; 306)
Note:				*p**p***p<0.01

Table 26 Pull Models for Developed Nations

	Dependent variable:			
	Log Inflow			
	Basic	High Skilled Policy	Global Engagement	Tertiary Enrollment
	(1)	(2)	(3)	(4)
Log (Purchasing Power Parity)	-0.034**	-0.024	-0.031	-0.041***
	(0.013)	(0.015)	(0.028)	(0.016)
Log (GNI per capita)	0.611***	0.498***	0.479	1.633**
	(0.184)	(0.149)	(0.301)	(0.810)
Global Rankings	-0.008	-0.004	-0.005	-0.016*
	(0.006)	(0.009)	(0.006)	(0.008)
Log (GDP)	2.717***	2.711***	2.786***	0.048
	(0.208)	(0.225)	(0.269)	(2.160)
High Skilled Immigration Policy (Raise)		0.011*		
		(0.006)		
Log (Total IGO memberships)			0.097	
			(0.247)	
Trade (% of GDP)			0.018	
			(0.026)	
Log (Gross Tertiary Enrollment Ratio)				0.050

				(0.143)
Constant	-2.479***	-2.359***	-2.533***	
	(0.240)	(0.224)	(0.349)	
Fixed effects (Country)	No	No	No	Yes
Observations	580	213	488	497
R^2	0.596	0.645	0.566	0.518
Adjusted R^2	0.593	0.637	0.560	0.474
F Statistic	843.181***	407.067***	614.243***	97.695*** (df = 5; 454)
Note:				*p**p***p<0.01

The final group of pull models for developing nations shows somewhat different results compared to the previous two models for more developed nations. Two common pull factors, GDP and more favorable immigration policies for high-skilled workers, are also positively associated with the volume of international student inflow for developing nations. For global engagement models, the number of IGO memberships is statistically significant as in OECD and world pull models.

However, compared to the more developed nation models, global rankings are positively associated with the number of international student inflow in both basic and tertiary enrollment models. Economic indicators other than GDP are not statistically significant. Rather, the gross enrollment ratio in tertiary education is positively related to the volume of international students. In general, higher education factors seem to be important pull factors for developing nations compared to developed nations. As stated earlier, developed nations are more likely to have a certain level of quality and reputation in higher education. Therefore, students may place more importance on economic factors once they decide to study in developed nations. On the other hand, in developing nations, educational factors seem to be more important than the cost of living and GNI per capita controlling for GDP.

Table 27 Pull Models for Developing Nations

	Dependent variable:			
	Log Inflow			
	Basic	High Skilled Policy	Global Engagement	Tertiary Enrollment
	(1)	(2)	(3)	(4)
Log (GDP)	2.703***	2.552***	3.969***	3.452***
	(0.415)	(0.406)	(1.103)	(0.920)
Log (Purchasing Power Parity)	0.022	0.048	0.001	0.011
	(0.023)	(0.034)	(0.029)	(0.016)
Log (GNI per capita)	-0.060	-0.153	-0.744	-0.727
	(0.302)	(0.231)	(0.538)	(0.584)
Global Rankings	0.042**	-0.008	0.016	0.040**
	(0.020)	(0.025)	(0.023)	(0.018)
High Skilled Immigration Policy (Raise)		0.037*		
		(0.021)		
Log (Total IGO memberships)			1.215**	
			(0.592)	
Trade (% of GDP)			0.043	
			(0.051)	
Log (Gross Tertiary Enrollment Ratio)				0.241**
				(0.095)
Constant	-1.807***	-1.516***		
	(0.423)	(0.354)		
Fixed effects (Country)	No	No	Yes	Yes
Observations	566	235	392	473
R^2	0.333	0.319	0.382	0.379
Adjusted R^2	0.328	0.304	0.301	0.312
F Statistic	279.358***	111.165***	35.585*** (df = 6; 346)	52.004*** (df = 5; 426)
Note:				*p**p***p<0.01

In summary, there are similarities and differences between the world pull models and sub-group models. The common factors include GDP and favorable immigration policies for

high-skilled workers. The number of IGOs and gross enrollment ratio in tertiary education are also generally positively related to the volume of international student inflow. However, while the cost of living is an important pull factor in developed nations, quality and capacity of higher education seem to be more important in developing nations. These differences between developed and developing nations are generally aligned with findings from a previous study. Wei (2012) examined pull factors in four pairs of origin-destination groups: 1) developing to developing countries, 2) developing to developed, 3) developed to developing, 4) developed to developed. The findings reveal that both economic and educational factors are important for developing nations as a destination. For developed nations as a destination, students from developed nations place more weight on educational factors while students from developing nations only consider economic factors.

Tables 28 through 30 present the results of push models. As with the pull models, world push models were first tested, and then additional sets of subgroup analyses for developing and developed nations were followed to examine whether there is any difference between them. Each table shows results for five push models: 1) basic model with GNI per capita and college-age population, 2) basic model with global ranking indicators added, 3) basic model plus the number of IGO memberships and trade as a proportion of GDP, 4) basic model with political stability scores, and 5) unemployment rates and population density in addition to all mentioned variables. Diagnostic tests confirmed that most models need both time and individual effects. The bottom of the tables shows what types of fixed effects are included in each model. GDP was initially added to the model but dropped due to high variance inflation factor (VIF) score with the remaining variables.

Table 28 World Push Models

	Dependent variable:				
	Log Outflow				
	Basic	Global Rankings	Global Engagement	Political Stability	All Together
	(1)	(2)	(3)	(4)	(5)
Log (GNI per capita)	4.238***	3.468***	4.718***	4.449***	5.054***
	(0.985)	(1.290)	(1.089)	(0.998)	(1.096)
Log (College-age Population)	6.223***	5.178***	6.178***	6.158***	2.024
	(1.362)	(1.605)	(1.409)	(1.364)	(2.434)
Log (# of Total IGO memberships)			1.916		3.516***
			(1.378)		(0.835)
Trade (% of GDP)			0.026		0.020
			(0.084)		(0.084)
Year 2000	0.067***		0.061***		
	(0.014)		(0.015)		
Log (Population Density)					2.566**
					(1.252)
Unemployment					0.001
					(0.005)
Political Stability				-0.077**	-0.081***
				(0.032)	(0.029)
Year 2001	0.087***		0.080***	0.070***	0.046**
	(0.023)		(0.025)	(0.020)	(0.023)
Year2002	0.161***		0.148***		
	(0.029)		(0.031)		
Year2003	0.193***		0.171***	0.182***	0.131***
	(0.032)		(0.034)	(0.031)	(0.035)
Year2004	0.160***		0.130***	0.137***	0.073*
	(0.039)		(0.040)	(0.038)	(0.042)
Global Rankings (ARWU and QS)		-0.005			
		(0.071)			
Year 2005	0.167***	0.010	0.122***	0.142***	0.040
	(0.045)	(0.017)	(0.047)	(0.045)	(0.051)

Year 2006	0.176***	0.026	0.124**	0.150***	0.036
	(0.051)	(0.024)	(0.052)	(0.050)	(0.058)
Year 2007	0.195***	0.053	0.135**	0.168***	0.041
	(0.060)	(0.037)	(0.061)	(0.059)	(0.070)
Year 2008	0.208***	0.082*	0.144**	0.180***	0.044
	(0.066)	(0.045)	(0.066)	(0.066)	(0.077)
Year 2009	0.245***	0.122**	0.159**	0.214***	0.050
	(0.072)	(0.053)	(0.071)	(0.072)	(0.083)
Year 2010	0.292***	0.167***	0.213***	0.261***	0.091
	(0.071)	(0.053)	(0.070)	(0.071)	(0.084)
Year 2011	0.299***	0.177***	0.210***	0.267***	0.078
	(0.076)	(0.058)	(0.075)	(0.075)	(0.090)
Year 2012	0.275***	0.159**	0.191**	0.244***	0.056
	(0.081)	(0.068)	(0.078)	(0.081)	(0.095)
Year 2013	0.279***	0.170**	0.194**	0.247***	0.049
	(0.084)	(0.073)	(0.081)	(0.084)	(0.100)
Year 2014	0.306***	0.202**	0.210**	0.276***	0.061
	(0.092)	(0.081)	(0.086)	(0.090)	(0.106)
Year 2015	0.335***	0.233***	0.255***	0.303***	0.104
	(0.093)	(0.084)	(0.089)	(0.091)	(0.110)
Year 2016	0.378***	0.276***		0.345***	
	(0.096)	(0.089)		(0.095)	
Year 2017	0.420***	0.319***		0.385***	
	(0.100)	(0.093)		(0.099)	
Fixed effects (Country)	Yes	Yes	Yes	Yes	Yes
Fixed effects (Year)	Yes	Yes	Yes	Yes	Yes
Observations	3,190	2,359	2,626	2,824	2,216
R^2	0.507	0.414	0.517	0.521	0.574
Adjusted R^2	0.474	0.361	0.481	0.485	0.538
F Statistic	153.730*** (df = 20; 2992)	95.579*** (df = 16; 2161)	130.705*** (df = 20; 2446)	150.226*** (df = 19; 2627)	131.082*** (df = 21; 2042)
Note:					*p**p***p<0.01

Table 29 Push Models for Developed Nations

	Dependent variable:				
	Log Outflow				
	Basic	Global Rankings	Global Engagement	Political Stability	All Together
	(1)	(2)	(3)	(4)	(5)
Log (GNI per capita)	6.061***	3.280*	5.965***	6.081***	5.064***
	(0.692)	(1.946)	(1.838)	(0.695)	(0.979)
Log (College-age Population)	4.126***	-0.111	1.903	0.372	2.476
	(0.940)	(1.911)	(2.830)	(1.845)	(3.060)
Global Rankings (ARWU and QS)		-0.077			
		(0.060)			
Log (# of Total IGO memberships)			2.377		2.410
			(1.592)		(1.580)
Trade (% of GDP)			0.137		0.089
			(0.162)		(0.145)
Year 2000			0.072*		
			(0.037)		
Year 2001			0.048		
			(0.037)		
Year2002			0.046		
			(0.045)		
Year2003			0.058		
			(0.059)		
Year2004			-0.036		
			(0.069)		
Year 2005		0.020	-0.077		
		(0.042)	(0.084)		
Year 2006		0.039	-0.089		
		(0.057)	(0.094)		
Year 2007		0.043	-0.121		
		(0.074)	(0.107)		
Year 2008		0.084	-0.149		
		(0.067)	(0.115)		
Year 2009		0.117	-0.139		

		(0.079)	(0.123)		
Year 2010		0.183**	-0.055		
		(0.074)	(0.116)		
Year 2011		0.225***	-0.041		
		(0.079)	(0.120)		
Year 2012		0.227**	-0.049		
		(0.089)	(0.126)		
Year 2013		0.230**	-0.057		
		(0.095)	(0.133)		
Year 2014		0.222**	-0.091		
		(0.103)	(0.142)		
Year 2015		0.233**	-0.085		
		(0.109)	(0.151)		
Year 2016		0.227*			
		(0.116)			
Year 2017		0.239*			
		(0.124)			
Log (Population Density)					-2.690
					(1.851)
Unemployment					0.006
					(0.005)
Political Stability				-0.010	-0.001
				(0.063)	(0.077)
Constant	-1.428				
	(1.214)				
Fixed effects (Country)	No	Yes	Yes	Yes	Yes
Fixed effects (Year)	No	Yes	Yes	No	No
Observations	811	615	727	726	641
R^2	0.476	0.488	0.523	0.497	0.517
Adjusted R^2	0.475	0.432	0.478	0.464	0.477
F Statistic	734.861***	32.951*** (df = 16; 554)	36.359*** (df = 20; 664)	224.163*** (df = 3; 680)	90.452*** (df = 7; 591)
Note:					*p**p***p<0.01

Table 30 Push Models for Developing Countries

	Dependent variable:				
	Log Outflow				
	Basic	Global Rankings	Global Engagement	Political Stability	All Together
	(1)	(2)	(3)	(4)	(5)
Log (GNI per capita)	3.857***	3.377**	4.592***	4.138***	4.827***
	(1.104)	(1.471)	(1.217)	(1.112)	(1.211)
Log (College-age Population)	6.027***	7.036***	5.004***	6.266***	-0.663
	(1.710)	(2.095)	(1.912)	(1.741)	(3.153)
Log (# of Total IGO memberships)			1.428		3.519***
			(1.788)		(0.918)
Trade (% of GDP)			0.018		0.015
			(0.095)		(0.099)
Year 2000	0.065***		0.059***		
	(0.014)		(0.015)		
Log (Population Density)					2.958*
					(1.579)
Unemployment					0.003
					(0.007)
Political Stability				-0.085**	-0.085***
				(0.035)	(0.031)
Year 2001	0.094***		0.093***	0.072***	0.044*
	(0.027)		(0.033)	(0.023)	(0.025)
Year2002	0.188***		0.187***		
	(0.035)		(0.039)		
Year2003	0.226***		0.218***	0.209***	0.168***
	(0.038)		(0.041)	(0.035)	(0.040)
Year2004	0.209***		0.198***	0.182***	0.135***
	(0.045)		(0.049)	(0.042)	(0.047)
Global Rankings (ARWU and QS)		0.066			
		(0.111)			
Year 2005	0.221***	0.010	0.202***	0.193***	0.114**
	(0.051)	(0.016)	(0.056)	(0.050)	(0.056)

Year 2006	0.233***	0.023	0.208***	0.202***	0.113*
	(0.057)	(0.026)	(0.062)	(0.056)	(0.065)
Year 2007	0.262***	0.054	0.232***	0.226***	0.133
	(0.069)	(0.041)	(0.072)	(0.067)	(0.081)
Year 2008	0.284***	0.079	0.253***	0.246***	0.151*
	(0.075)	(0.053)	(0.078)	(0.075)	(0.090)
Year 2009	0.324***	0.119*	0.271***	0.283***	0.158
	(0.082)	(0.062)	(0.084)	(0.082)	(0.097)
Year 2010	0.363***	0.155**	0.321***	0.324***	0.195*
	(0.083)	(0.064)	(0.086)	(0.082)	(0.102)
Year 2011	0.359***	0.153**	0.309***	0.319***	0.172
	(0.090)	(0.071)	(0.093)	(0.088)	(0.110)
Year 2012	0.327***	0.123	0.279***	0.284***	0.136
	(0.097)	(0.084)	(0.097)	(0.095)	(0.117)
Year 2013	0.333***	0.133	0.284***	0.289***	0.130
	(0.102)	(0.090)	(0.102)	(0.100)	(0.124)
Year 2014	0.375***	0.177*	0.322***	0.333***	0.166
	(0.112)	(0.101)	(0.109)	(0.107)	(0.131)
Year 2015	0.410***	0.214**	0.373***	0.367***	0.222
	(0.113)	(0.104)	(0.112)	(0.108)	(0.137)
Year 2016	0.474***	0.275**		0.429***	
	(0.116)	(0.110)		(0.113)	
Year 2017	0.536***	0.334***		0.489***	
	(0.120)	(0.115)		(0.118)	
Fixed effects (Country)	Yes	Yes	Yes	Yes	Yes
Fixed effects (Year)	Yes	Yes	Yes	Yes	Yes
Observations	2,379	1,744	1,899	2,098	1,575
R^2	0.523	0.415	0.535	0.537	0.600
Adjusted R^2	0.490	0.359	0.500	0.501	0.564
F Statistic	121.736*** (df = 20; 2224)	70.415*** (df = 16; 1591)	101.548*** (df = 20; 1762)	118.791*** (df = 19; 1944)	103.308*** (df = 21; 1444)
Note:					*p**p***p<0.01

Across all models, the income level of the sending country based on GNI per capita is found to be positively associated with the volume of college student outflow. As college students and their families generally bear the cost of study abroad, the nation's average income level

signals affordability of tuition, fees, and living costs for overseas education. The total number of IGO membership, political stability, population density, and college-age population are also statistically significant in some models. The positive association between the number of IGO memberships and the outflow indicates that a sending nation's more active engagement in intergovernmental organizations is positively associated with their students going abroad for college degrees. Also, political stability is negatively associated with international student outflow. The college-age population is also positively related to international student outflow in the first four models. However, once controlling for political stability, population density, and unemployment, it becomes statistically insignificant.

Subgroup analysis shows that average income level is the only statistically significant push factor in developed nations while the number of IGO memberships, population density, political stability, and college-age population are also positively associated with international student outflow in some models.

To summarize, regardless of development level group, the income level of sending nations is positively associated with more student outflow, which emphasizes the importance of the average income level in study abroad for college degrees. Similar to the pull models for developed and developing nations, the push model results also show differences between developed and developing countries. In addition to the common push factor, average income level, more networks with other nations based on intergovernmental memberships, more severe resource competition between people in the country, and political instability are statistically significant in developing nations.

One possible downside of these push and pull models is the use of unscaled international student flows as dependent variables. Some of the statistical significance from these models

could be due to the size of the country's population. Even though the gravity theory has already proven that migration is a function of the size of a country, the push and pull models were not scaled by country population. To examine whether the statistical significance of push and pull factors is driven by a country's population, additional push and pull models were tested with two more revisions. There are two significant outliers, China, in terms of international student outflow, and the U.S., in terms of international student inflow. To check whether these two countries with extreme values in international student flows impacted the overall estimates of regression coefficients, they were dropped from analysis. In addition, the gross tertiary enrollment ratio is not a complete measure of a country's capacity for higher education. As an alternative measure, the gross tertiary enrollment ratio was replaced with tertiary education enrollment. Tables 31 through 36 in the appendix presents additional push and pull model results with three revisions.

According to the results, the overall statistical significance and the direction of the coefficient signs are similar to the original models addressed in this chapter. The main differences are the statistical significance of GDP and GNI per capita in the pull models. Excluding OECD pull models, the GDP becomes statistically insignificant while GNI per capita becomes significant. This indicates that the national income level is the main economic pull factor, not the size of the economy. However, in OECD models that use the annual wage level indicator instead of GNI per capita, the GDP remains statistically significant with the increased coefficient, while the annual wage level becomes statistically significant. When the annual wage level is replaced by the GNI per capita, the statistical insignificance of GDP and significance of GNI per capita are the same as in other revised pull models. Even though the annual wage level and GNI per capita are highly correlated, the gross national income (GNI) is a broader term than

wage. The differences between these two measures affected the statistical significance of GDP. This implies the importance of choosing the right indicator, one that represents a measure of interest and possible differences in results. Another difference in the revised models is the statistical significance of population density and political stability in the push models for developing countries. The statistical significance of these two indicators in the original models could be either directly or indirectly related to the size of the country, so they become insignificant when the dependent variable is scaled by each country's population.

The revised models reaffirm the statistical significance of push and pull factors in the original models, except for economic factors, political stability, and population density. The revised models also show the importance of GNI per capita in both push and pull models rather than the economic size of the country. The OECD pull models also imply differences in wage and income level indicators as pull factors; this is a topic that requires further study.

The findings from push and pull factors and descriptive patterns confirm different migration theories' explanations in Chapter 2. First, the statistical significance of the income level in the pull models for developed and OECD nations is associated with the neoclassical theory's emphasis on wage level differentials. Second, the quality and capacity of higher education, as represented by global rankings and tertiary gross enrollment ratio in the destination country, is illustrated in human capital theory. Third, the strong network effect in the pull model can be explained by the network theory. Fourth, the positive association between the number of intergovernmental organizations and international student flows can be associated with the migration system theory. Additionally, the importance of the international political order in international student flows, from the rise of China and Russia and the relatively stable periphery group with the presence of strong core actors in both international student inflows and outflows,

can be partially described using the world system theory. However, the emerging actors in the global higher education market and the significant role of national governments' policies in changing international student flows signal that the system is not completely stable. All of these explanations reaffirm that international student migration is a complex phenomenon, one that cannot be explained by a single theory. Different migration theories contribute to a fuller understanding of the phenomenon.

Pg. 115~118 Revised Push and Pull Models

One possible downside of these push and pull models is the use of unscaled international student flows as dependent variables. Some of the statistical significance from these models could be due to the size of the country's population. Even though the gravity theory has already proven that migration is a function of the size of a country, the push and pull models were not scaled by country population. To examine whether the statistical significance of push and pull factors is driven by a country's population, additional push and pull models were tested with two more revisions. There are two significant outliers, China, in terms of international student outflow, and the U.S., in terms of international student inflow. To check whether these two countries with extreme values in international student flows impacted the overall estimates of regression coefficients, they were dropped from analysis. In addition, the gross tertiary enrollment ratio is not a complete measure of a country's capacity for higher education. As an alternative measure, the gross tertiary enrollment ratio was replaced with tertiary education enrollment. Tables 31 through 36 in the appendix presents additional push and pull model results with three revisions.

According to the results, the overall statistical significance and the direction of the coefficient signs are similar to the original models addressed in this chapter. The main

differences are the statistical significance of GDP and GNI per capita in the pull models. Excluding OECD pull models, the GDP becomes statistically insignificant while GNI per capita becomes significant. This indicates that the national income level is the main economic pull factor, not the size of the economy. However, in OECD models that use the annual wage level indicator instead of GNI per capita, the GDP remains statistically significant with the increased coefficient, while the annual wage level becomes statistically significant. When the annual wage level is replaced by the GNI per capita, the statistical insignificance of GDP and significance of GNI per capita are the same as in other revised pull models. Even though the annual wage level and GNI per capita are highly correlated, the gross national income (GNI) is a broader term than wage. The differences between these two measures affected the statistical significance of GDP. This implies the importance of choosing the right indicator, one that represents a measure of interest and possible differences in results. Another difference in the revised models is the statistical significance of population density and political stability in the push models for developing countries. The statistical significance of these two indicators in the original models could be either directly or indirectly related to the size of the country, so they become insignificant when the dependent variable is scaled by each country's population.

The revised models reaffirm the statistical significance of push and pull factors in the original models, except for economic factors, political stability, and population density. The revised models also show the importance of GNI per capita in both push and pull models rather than the economic size of the country. The OECD pull models also imply differences in wage and income level indicators as pull factors; this is a topic that requires further study.

The findings from push and pull factors and descriptive patterns confirm different migration theories' explanations in Chapter 2. First, the statistical significance of the income

level in the pull models for developed and OECD nations is associated with the neoclassical theory's emphasis on wage level differentials. Second, the quality and capacity of higher education, as represented by global rankings and tertiary gross enrollment ratio in the destination country, is illustrated in human capital theory. Third, the strong network effect in the pull model can be explained by the network theory. Fourth, the positive association between the number of intergovernmental organizations and international student flows can be associated with the migration system theory. Additionally, the importance of the international political order in international student flows, from the rise of China and Russia and the relatively stable periphery group with the presence of strong core actors in both international student inflows and outflows, can be partially described using the world system theory. However, the emerging actors in the global higher education market and the significant role of national governments' policies in changing international student flows signal that the system is not completely stable. All of these explanations reaffirm that international student migration is a complex phenomenon, one that cannot be explained by a single theory. Different migration theories contribute to a fuller understanding of the phenomenon.

CHAPTER 5

POLICY IMPLICATIONS AND LIMITATIONS

Policy Implications

Supply factors in international student mobility. This study broadly covers selected push and pull factors in previous literature and theories. However, the models miss many details related to international student mobility. For instance, Findlay (2011) points out the importance of supply side factors in international student mobility. These include policies implemented at different levels of the global higher education system. For instance, immigration and higher education policies in each country directly and indirectly influence international students' decisions.

Immigration policies in many developed nations have fluctuated in recent years, which reflects the influence of domestic political swings in those countries. In many cases, the economic benefits of international students as a potential pool of skilled migrants did not mitigate conservative political parties' far-right nationalism, which led to restrictions on the entry of all immigrants. As restrictions on student visas and work after study reduce the supply of study abroad opportunities, they affect the number of inbound international students. The negative impact of strict regulations could be more pronounced for students from developing countries as post-graduation employability is one of their major reasons for choosing a particular destination. Such restrictions could also affect mobility patterns by giving international students

the impression that these countries are unwelcoming and hostile, making them reluctant to choose them as hosting nations.

In this study, an immigration policy variable was added to pull models to examine whether a change in immigration policies for highly skilled workers is associated with the volume of international student inflow. The results confirmed a positive relationship between favorable immigration policies and the number of inbound international students. The findings were consistent for developing and developed nations in sub-group analyses. Therefore, when developed nations restrict their immigration policies, developing nations can use this to their advantage. As the positive association between favorable immigration policies and the volume of international students is not restricted to developed nations, developing nations can utilize immigration policies to attract international students who were discouraged by developed nations' strict regulations. Once they have more international students, higher education institutions and countries can expand the potential pool of inbound students through the network formed by those students.

Other important supply factors that should not be disregarded are higher education institutions and educational agents who are directly connected to international students and have carried out various recruitment activities. These two actors have actively recruited international students since the globalization and liberalization of higher education reshaped the global higher education market and higher education became an export industry in many countries. Higher education institutions lure international students with diverse marketing activities through different sources. For instance, they participate in recruitment fairs, utilize alumni networks, advertise their education programs online, including on social media, and distribute brochures (Onk & Joseph, 2017; Sawahel, 2015).

While higher education institutions organize various campaigns themselves, they also often rely on intermediaries for student recruitment. For instance, more than 45% of international students in Australia and New Zealand and 35% of U.K. undergraduate international students were recruited by agents between 1996 and 2005 (Mazzarol & Hosie, 1996; Robinson & Magyar, 2018). These intermediaries include educational consultants, brokers, and agents. They connect international students to educational providers and higher education institutions in destination countries. They function as useful information providers to students and are an effective promotional and marketing tool for higher education institutions. As the latter increasingly compete with each other to attract international students and the global higher education market becomes unstable and unpredictable, more institutions are partnering with agents who have local intelligence and professional skills to recruit international students (Hulme et al., 2014).

All these elements could not be easily incorporated into this study because of the scope of analysis and data availability. However, as higher education institutions and educational agents are key parts of international student migration studies, further studies are required to explain how different policies and actors interact and influence mobility patterns. For instance, it is worth exploring how nationalist policies at the state level interact with institutional efforts to increase fee-paying international student enrollment. Furthermore, future research could examine the extent to which conflicting national and institutional policies affect students' decision to study abroad and choice of destination. This type of analysis can be done by reviewing policy documents and conducting focus group interviews or surveys targeting international students who are navigating conflicting policies of institutions, nation-states, and regional organizations.

Network and community. Network and community have been increasingly emphasized in recent migration studies, as briefly introduced in Chapter 2. Accordingly, this study added two possible network effect measures: international migrant stock and the number of IGO memberships for each country. Migrants in destination countries tend to build their communities and share knowledge and information with potential migrants from their origin countries. More migrants in destination countries mean more possible connections with potential migrants through the networks that emerge between the origin and destination countries. In a similar way, at the country level, the networks between countries through co-memberships in IGOs can present more opportunities for interaction between those countries, including knowledge sharing and educational partnerships. Both network measures were found to be statistically significant in the pull models.

Although this study did not add more specific measures of network and community to the model, they are key factors that require further investigation. Many recent theories and studies explaining international student mobility have included social capital, community, and networking effects. As explained in Chapter 2, human geographers and sociologists assert that the information and advice gathered from a student's community have become more important over time.

With the growing popularity of social networking sites, students are spending more time engaged in virtual networking activities and obtaining information from those connections. Their perceptions of other geographical locations (e.g., a foreign country as their potential study abroad destination) are largely influenced by the information and indirect experiences shared by their close friends, family members, and others in their wider social networks. In addition, studies have found that relational ties among countries, networks, and communities of students have

become more important in recent times (Beech, 2015; Perkins & Neumayer, 2013). Acknowledging the importance of the network effect, many institutions have developed marketing and recruitment strategies that use social media with varying degrees of effectiveness (Bélanger et al., 2014; Choudada, 2013; Choudaha & Chang, 2012; Sawahel, 2015; Vrontis et al., 2018).

Along with the networks formed among individuals, ties between countries through different relationships and intergovernmental policies also generate routes for their people to become interconnected. As Chapter 2 presents, the imaginative geography and migration system theory emphasize relational ties and interdependence among different actors. Theses relationships can be historically rooted such as colonial relationships, formed between countries for economic or political purpose in modern times such as bilateral and regional trade agreements, or encompass other bilateral relationships, including co-membership in regional/intergovernmental organizations. These country-to-country networks stemming from various relationships can open routes for the flow of people, including international student mobility.

Thus, some educational networks are extensions of other bilateral relationships between countries. For instance, one of the main reasons for the establishment of Saudi Arabia's King Abdullah Scholarship Program in higher education was to rebuild international relations with developed countries in the West in the aftermath of the 9/11 attack (Hirlal et al., 2015). In addition, China's Silk Road Economic Belt initiatives include promoting educational connections with "Belt and Road" countries by funding talented international students from those countries, building a "Belt and Road education community," and exerting soft power (Tian et al., 2020, p. 4). Both these cases illustrate how other bilateral relationships can be expanded to

educational connections and planned networks. Saudi Arabia and China have strategically used educational exchanges and built network connections with other countries to boost their geopolitical and economic relationships. Therefore, it is important to understand national policies for international students and educational networks as an extension of different relations with other countries (Raghuram et al., 2009; Riano et al., 2018).

Moreover, meso-level connections, such as connections between international education agents, brokers, and higher education institutions, can impact mobility patterns. All these networks at different levels provide channels for information sharing and facilitate interactions between various stakeholders of international higher education, which could positively influence flows of international students. Therefore, establishing and maintaining these networks can be a good strategy for institutions and countries to attract more international students.

Although previous studies confirmed the network effect, more in-depth studies are needed to explore how networking effects interact with other factors, what possible network routes exist, how different types of networks and communities influence study abroad decisions, and to what extent they contribute to these decisions compared to traditional educational and economic factors.

Migration studies including international student mobility often apply the network of co-nationals and the pre-existing stock of migrants in the destination country as a measure of the network (Beine et al., 2014; Min & Rod, 2018). This study did the same. However, this only accounts for a fraction of the various types of network effects. More research is required to identify and describe different types of network connections that are relevant to students' decision-making process, and incorporate them into analyses. This will provide valuable insights

to assist international higher education stakeholders in planning and implementing international student polices.

Shocks and resilience. Shocks at the national, regional, and global level have shifted international student flows to varying degrees for different periods of time. The global level graph in chapter 4 does not show a sudden pattern change due to a global shock including the global financial crisis between 2007 and 2008. Some recent shocks were briefly covered in chapter 2, including 9/11, Brexit, the global financial crisis, large-scale floods in Southeast Asia, and COVID-19. In particular, COVID-19 has caused an unprecedented level of disruption in international higher education. Historically, countries have recovered from such shocks. A recent study emphasized the resilience of higher education institutions and countries to shocks and noted that the fluctuations they experience can be temporary (Wu, 2020). Indeed, the Institute of International Education stated that 43% of higher education institutions received a greater number of international applications for the 2021 academic year than in 2020, which could be a sign of recovery (Fisher, 2021). However, most international organizations and international higher education research units forecast an overall decrease in international student enrollment in the coming years (Durnin, 2020; Goris, 2020; Martel, 2020; Schulmann & Trines, 2020).

Although many countries and higher education institutions will eventually return to normal, whether mobility patterns will be similar to pre-pandemic times or transform previous pattern with unprecedented trend remains to be seen. One study shared the results of a survey of more than 2,000 Chinese students, in both mainland China and Hong Kong, showing that the majority of students would still consider studying abroad, but most would prefer to study in nearby countries in the region (Mok et al., 2021). With anti-Asian incidents reported in the media and shared through social networking sites, the hostile image of selected destinations could

discourage Asian students from choosing to study abroad, including in countries within the region.

However, countries and higher education institutions can find opportunities in crisis. For instance, countries can target more intra-regional mobility and build networks that can increase the potential pool of incoming students. For higher education institutions with international branch campuses, they can invest more in quality enhancement as quality disparities between home campuses and international branches have often been criticized. Additionally, by creating stronger connections to home campuses, such as by developing virtual co-programs, branch campuses can accommodate students who aspire to study abroad and build their brand image in foreign countries.

The expansion of online education and virtual mobility. This study examines the physical mobility between countries of students pursuing tertiary education degrees. However, given the growing number of institutions providing opportunities for online education, including degree programs, and more students around the world gaining access to the internet, there is an alternative route for students to earn a foreign degree: in the virtual space. The COVID-19 pandemic has opened opportunities for institutions to develop online platforms and the infrastructure to accommodate students who cannot physically move across borders. Although this will disproportionally benefit countries and higher education institutions that have the resources to develop quality online educational infrastructure, online education can provide opportunities to many different groups of international higher education actors. For instance, for students who cannot afford to travel and live in a foreign county, online education is an alternative means of obtaining educational training from a foreign higher education institution. This could be particularly valuable for students who have limited access to quality higher

education in their home countries. It could also facilitate collaborations among higher education institutions across countries as it removes the barriers typically related to geographical distance.

Various virtual mobility projects and initiatives have been implemented in Europe. Many countries are in the process of developing better online educational environments, including Erasmus+ Virtual Exchange, the Open Virtual Mobility Learning Hub, and the European Association of Distance Teaching Universities' Task Force Virtual Mobility (Andrei et al., 2019). However, as previously discussed, international students pursue foreign degrees for various reasons, including temporary or permanent migration and post-graduation work experience in destination countries. These objectives cannot be fulfilled by virtual mobility, so physical mobility will remain a better option for many students. Nevertheless, online education and virtual mobility will continue to be developing trends in the coming years, so it is important for higher education stakeholders to predict and prepare for how technology development and innovation will reshape the international higher education landscape and influence overall patterns.

Another important issue related to online education and virtual mobility in higher education is that current data on global international students are limited to physical mobility, that is, the number of international students physically crossing a border. With a growing number of higher-education institutions offering online degrees, a growing number of international students now enroll in foreign online degree programs. In addition, the development of information and communications technology (ICT) and the recent pandemic experience has promoted more investment on online education in many countries. This highlights the need to track the number of international students who pursue their foreign degrees virtually. It remains to be seen how the expansion of online education can or will reshape previous patterns of

international student mobility and reduce existing inequalities in international higher education around the world. The first step to predict, understand, and analyze issues regarding the virtual mobility should start with systemic data collection of international students enrolling online degree or credit programs at institution and country level.

Quantitative and qualitative studies for an integrated understanding. In most social science disciplines, qualitative and quantitative research studies have their own value which can improve our understanding of different issues. International student mobility and migration studies are no exception. Qualitative studies can enrich our understanding of the complexity of the phenomenon, while quantitative studies can test particular relationships of interest and generalize findings to bigger populations. Qualitative studies in international student migration/mobility are as important as findings with numbers and quantitative approaches. There are many factors that cannot be easily quantified or systematically collected but are key elements of the phenomenon.

For instance, individual choice models that oversimplify international students' decision-making processes often fail to capture non-traditional factors other than economic and educational ones, particularly those that are difficult to quantify. Additionally, many quantitative studies on international student mobility pay little attention to the fact that there are a number of different groups of students whose motivations for international study vary. Educational factors, such as an institution's reputation and prestige regarding quality education, may be more influential for advanced degree pursuers (e.g., graduate or professional programs). Some studies revealed that undergraduate students consider the leisure, well-being, and experiential components of international education to be more important than institutional reputation when choosing a study abroad destination (Prazeres et al., 2017; Waters et al., 2011). Focus group

interviews of international students studying in three European countries showed that students prefer places that are aligned with their lifestyle, worldview, and value system (Prazeres et al., 2017). Therefore, appealing elements such as an urban location and the associated amenities can supersede academic and financial benefits (Prazeres et al., 2017). This may more often be the case for younger generations, who place more emphasis on quality of life, fun, and leisure than older generations.

Moreover, it is not easy to quantify one's image and perception of a geographical location that has been developed through direct and indirect transnational experience. Students' perceptions of a place are not just based on objective evaluations at any particular time; rather, they are gradually formed as an accumulated image from students being exposed to various sources. As discussed earlier, perceptions of places are shaped by one's direct experiences in foreign countries (mobility capital), conversations and interactions with people in wider networks (social capital), and the image portrayed by media, books, and all possible information sources.

The downside of qualitative studies is that it is difficult to generalize the findings, as the samples are usually small and not representative of wider populations. It is the quantitative scholar's duty to find out whether some of the findings can be generalized to a larger group of students. On the upside, qualitative studies enable richer descriptions of phenomena that cannot be captured by quantitative models. Therefore, international higher education stakeholders are required to integrate findings and insights from both approaches to interpret the complex phenomenon of international student mobility. For researchers, findings from each method can provide opportunities to develop relevant studies. For instance, qualitative studies revealed that there are different clusters of international students based on the main drivers for studying abroad

and the key factors of destination choice. Quantitative researchers can design surveys testing different groups of factors and examine how those factors contribute to destination choices so that institutional recruitment plans can be better tuned to different segments of students.

The importance of historical/structural approaches. As briefly stated in chapter 2, some studies approached the migration phenomenon from a macro perspective and found that there are structural elements underpinning migration patterns. For example, as world system theory explains, the existing order (hierarchy) of countries in higher education is aligned with the economic order and benefits developed nations as they can utilize their abundant resources and established reputations to maintain academic hegemony. Developed nations' structural advantages related to their economic and educational superiority have put them in better positions to lure international students. For instance, developed countries are attractive to students who are considering becoming temporary or permanent labor migrants as economic development and prosperity provide higher living standards, a better labor market environment, and more career opportunities. Students with a strong educational drive tend to prefer developed nations as they are well known for their quality educational infrastructure and reputable higher education institutions. In addition, major cities in developed countries can attract students who want to experience diversity and fun activities. Accordingly, developed nations are popular destinations for different groups of international students.

Trend graphs in chapter 4 illustrated the unequal distribution of international students and growth. Most changes were observed in the semi-periphery and core countries while periphery countries remained inactive and less involved in the global higher education market. Considering that many periphery countries are underdeveloped and do not have enough quality higher education institutions and educational capacity compared to the growing youth population, there

exists unmet demand. However, both investing in higher education infrastructure and enhancing quality of higher education require resources, which those countries lack. At the micro level, there are a small group of students in the periphery countries who are privileged enough to have access to international higher education. However, much of their obtained skill and knowledge could not be distributed and utilized for education and development with brain drain. The world system theory is partially correct in that economic capacity and hegemonic power benefits core countries to invest more in higher education and further development.

Limited economic and human resources in periphery countries impede their growth in the global higher education market. However, chapter 4 revealed that a few semi-periphery countries were able to become strong actors in the global higher education market. How these emerging actors were able to elevate their positions in the global higher education market compared to their peers will help scholars and policy makers to understand structural and unistructural forces in international student mobility patterns.

Additionally, interdependence between countries through historical or economic linkages shapes structural patterns. For instance, power relations between former colonial powers and their colonies influence people's perceptions of particular countries and affect their destination choices. Moreover, the superiority of developed nations resulting from their historical relations and academic hegemony has resulted in relatively stable structures of international higher education, while modest changes have been observed for the nations in semi-periphery positions, as world system theory predicted. All these discourses and findings indicate that structural and non-structural elements shape international student mobility patterns. System-level longitudinal analysis has allowed us to understand structural and deterministic parts that have barely changed over a long period.

After acknowledging that there are structural, unchanging, and systemic elements in these patterns, the next step is to identify non-structural changes that can provide insights to international higher education stakeholders in developing nations. If there were only non-changing systemic and structural factors, growth in numbers of international students would be limited to developed countries. Although many studies show that the core–periphery structure is still notable in international student flows, growth in semi-periphery and developing nations has been observed (e.g., Malaysia, Saudi Arabia, and Turkey). These countries have been actively engaged in the global higher education market and have made internationalization efforts through government-led policies. Along with national-level policies to attract more international students, a possible approach for developing nations is to create strategies targeting non-structural elements of student mobility patterns and international perceptions of their suitability as host nations.

As many studies point out, international students are heterogeneous and have different nationalities, ethnicities, identities, and transnational experience in complex networks. As previously stated, the destination preferences of students from developing and developed nations differ. Even in the same country, students from different social classes have varying networks that impact their study abroad decisions. As some sociologists and human geographers have noted, students' decisions regarding studying abroad and destination are shaped by long-time exposure to different media content, social relationships, transnational experiences of individuals, and other environmental factors. Therefore, it is important to make students' perceptions of a country and/or higher education institution more positive and favorable. This cannot be done through short-term recruitment activities that treat them as 'objects' of financial resources. Creating sustainable relationships with international students, spreading word-of-

mouth from their positive overseas study experience, and utilizing alumni networks are good examples of ways to generate positive perceptions of places.

The importance of economic factors and their contribution to the uneven nature of higher education. A common finding from both push and pull models is the importance of economic factors in international student inflows. The statistical significance GNI per capita in both push and pull factor represents this finding. Also, the level of economic development, measured by GDP, has consistently been noted as a strong explanatory factor of international student inflows. Studies approaching international student mobility from macro perspectives show that economic positions in the world system and the centrality of nation-states in the global higher education market are closely related (Barnett & Wu, 1995; Chen & Barnett, 2000; Shields, 2013). The structural distinctions and hierarchy based on the level of economic development are relatively stable, which enables top actors to stay at the top with structural advantages.

In push models, the importance of average income levels in international student outflows indicates that financial constraints affect students' ability to get foreign degrees. Although college students can settle in destination countries as temporary workers or permanent immigrants, migrating to foreign countries for educational purposes requires a certain level of financial resources. Therefore, international education opportunities and benefits are more likely to be given to those who have financial resources, which leads to the reproduction of inequality. It is natural that students in underdeveloped nations are less likely to have the chance to study abroad unless financial aid is available to them. Some studies pointed out this uneven nature of international higher education for individuals and countries (Waters, 2012; Waters & Brooks, 2009). At the regional or supranational level, international and/or regional organizations can

expand financial assistance and scholarship opportunities for students from under-developed countries. At the national level, policymakers must review how international education can exacerbate existing inequalities and whether there are ways to expand opportunities to underprivileged groups.

Heterogeneity of international student migration. This study illustrated differences in the push and pull factors between developed and developing countries. Grouping countries by development level is one rough distinction among many subgroups of international student migration. Countries cluster by geographical distance, language and religion, historical relationships, and education system, among other patterns. At the individual level, international students seek college degrees abroad for reasons not limited to education, as migration theories and previous findings from focus groups have revealed. Students may prioritize leisure and cultural experiences instead. Given that subgroups of international students vary by intention and priority, it is essential to identify similar clusters so as to implement effective policies.

Policy selection in encouraging or discouraging international student flow. Push and pull models describe factors that may encourage or discourage international students from pursuing a college degree abroad. Higher education policymakers in both sending and receiving countries can gauge these factors to predict the volume of international students and control or facilitate inbound and outbound flows.

As briefly noted in Chapter 2, migration studies have proven that international students enrolled in tertiary education can benefit the local and national economies of their host nations. Some international students become skilled labor migrants after graduation, and international students at advanced levels can produce research and innovative products both during and after their studies. For higher education institutions facing financial constraints, international

undergraduate students have become an alternative revenue source as many are self-funded and pay full-tuition and fees. Many countries now prefer to have a greater influx of international students based on these benefits and other multiplier effects; however, the increasing number of international students in developed countries is likewise cause for concern. National security issues such as terrorist attacks and academic espionage have generated active discussions on how to screen and monitor incoming international students to filter out risky students. The rise of nationalism has also increased the number of people opposed to migrants including international students, with those claiming that international students steal local jobs.

For developing countries, sending domestic students abroad has traditionally been expected to benefit home countries, once students return and begin circulating the advanced knowledge and skills that they acquired in their host nations. Instead, many international students from developing countries do not return home after completing their degrees. Instead, they opt to stay in the host countries as migrants, contributing to the so-called "brain drain" from developing nations. To prevent brain drain, some governments provide international study scholarships and funding conditional upon students' return to their home countries after their degree completion.

The stated benefits and drawbacks of international student inflow and outflow have contributed to fluctuating international student policies in some countries. However, restricting all inbound and outbound international students is neither desirable nor possible; rather, policy decisions should be made based on a thorough review of well-designed impact studies. Considering that international student migration is a multi-faceted phenomenon, impact studies should include multiple perspectives.

Limitations and Future Studies

This study explored trends of international student flows and factors related to those flows through literature reviews, descriptive statistics, visualization, and panel data analysis. Even though the results are mostly consistent with the findings of previous studies, some findings are not as predicted and are counterintuitive. It is important to note that some of the findings based on descriptive statistics and trend graphs are not sufficient to explain the causes and details of certain issues; further studies are required to address this. An example is the effect of regional initiatives on international student mobility. As previously noted, the regional initiatives in Europe and the Southeast region did not lead to growth in intra-regional mobility for most countries in the region, which created 'imbalance' issues. This implies that there are other factors (e.g., structural, educational, and economic ones) that play more critical roles in student mobility. This can be further investigated in future papers, possibly through student surveys or other quantitative studies using student- or institution-level panel data. In addition, there are many policy factors, both at the national and the institution level, that could not be added to the model. As the literature shows, institutional recruitment activities and national policies regarding international students shift the patterns of student mobility. The only national-level policy included in this study is taken from the United Nations' summary of international migration policies, which contains five levels of policy pertaining to the level of immigrants in a country (no official policy, no intervention, lower, maintain, and raise) with 6 years of coverage (every two years between 2005 and 2015). These rough measures do not provide sufficient detail on the policies concerned, and policies aiming to raise or lower the level of immigrants have different goals in terms of optimal numbers. Additionally, other higher education policies in sending or receiving countries include government scholarships or other types of public funding for

studying abroad, as well as incentives and benefits for institutions with more international students. These policies and their influence on student mobility can be better addressed by national-level studies.

This study has three major limitations. The most challenging part of the data analysis in this chapter was the missing data. Many countries lack measures of student flow, particularly in earlier years before 2005. It is also difficult to find data on some of the key factors related to international student flows, such as the cost of higher education tuition and fees, the number of higher education institutions, and detailed information on immigration and higher education policies. For some of the data that are available, the coverage in terms of years and countries is rather limited and inconsistent. The measure of international migrant stock is an example of this, which is unfortunate as the network effect is a critical factor. As incomplete data for selected variables were excluded from the analysis, many countries were eventually omitted as well, introducing the risk of biased results and issues with external validity. Furthermore, as most missing data were not random, multiple imputation was not a viable option.

In addition, some indicators are not complete enough to reflect measures of interest, such as the definition of "capacity" in higher education. This study used gross tertiary enrollment ratios and tertiary education enrollment as a measure of the capacity of and participation level in tertiary education in a host country. The capacity of higher education systems can be defined in multiple ways, such as instruction and research capacity, the availability of quality programs, the number of institutions, the number of students those institutions can accommodate, and more. Also, the number of IGO memberships, or how many connections a country has to other countries through intergovernmental organizations, has many possible explanations in this study. Such details can map the networks between countries or indicate a country's structural position

in the global system. A high correlation between the total number of IGO memberships and GDP signals a close linkage to a country's international political order. Therefore, IGO membership indicates more than the networks countries voluntarily build. Among many intergovernmental networks, the networks formed among countries through educational partnerships could correlate directly with international student flows.

While alternative research methods or indicators can resolve some of these data limitations, there remains a lack of educational indicators that have been systemically collected for global comparison. More accurate measurements of how international organizations design and share key indicators for research purposes in global higher education could lead to better policy insights and explanations for contemporary issues in the field. Therefore, the findings from the panel data analysis should be carefully re-examined using more complete data on key factors. Also, the detailed explanations for descriptive patterns in this study could be better analyzed using qualitative research methods, such as policy document reviews and focus group interviews.

Another downside of this study is its use of aggregated data. While migration patterns and determinants can be analyzed using individual choice models and disaggregated data, this study used aggregated macro data at the nation-state level. As Pellegrini and Fotheringham (2002) pointed out, migration decisions are made by individuals who are affected by both personal attributes and environmental factors. Accordingly, both aspects need to be incorporated in spatial choice models. Using aggregated data for spatial behavior analysis risks underestimating the effects of individual variations. Some studies analyzed student migration using micro data on students within a particular country (D'Agostino et al., 2019; Ono, 2001). However, as acquiring student-level data for many countries is difficult or almost impossible, analyses of international

student mobility in multiple countries mostly rely on aggregated measures. Therefore, integrating analytic results from studies with individuals (students) as a unit of analysis could validate the findings of this study and reveal any variations across countries. Additionally, this study was built to explore the associations between international student flows and selected variables, not causal relations. If causal relations between one or more factors and international student flows are the main interest of future research, the study should be re-designed using quasi-experimental methods such as instrumental variable estimation, difference-in-difference, or regression discontinuity.

Although this study tested push and pull factors in two separate models, the latter do not stand alone; they affect each other simultaneously. The combined effects of those factors influence the overall trend of international student mobility. In addition, the panel data analysis using unilateral push and pull factors could not include information on bilateral relationships, such as historical connections, cultural proximity, and economic interconnectedness through bilateral trade policy. All these relational ties between countries and the network effect cannot be easily captured in analytic models, such as that in this study. Moreover, the level of each factor influencing the flow of international students is more likely to be affected by the relative value between the origin and destination, rather than the absolute level of factors. The gravity model method enables push and pull factors to be incorporated in one model, while accounting for bilateral relationships between them. Therefore, the next step in refining this study is to use a gravity model with bilateral factors and network effects added.

Even with these limitations, this study has merit as it serves as an explorative stage of future research involving more elaborate analysis of variables of interest, such as explorations of causal relations between student flows and other variables of interest (e.g., the impact of origin or

destination country policies on student flows). Additionally, it integrates and introduces different approaches and theoretical explanations for general migration studies. As a form of preliminary data analysis for further research, the main focus here was to describe the overall trend of flows using summary tables, visualization, and tests of correlations between flow measures and possible explanatory variables.

CHAPTER 6

CONCLUSION

International students have become a critical element of higher education and the national economy in many countries. As a result, a number of studies across different academic disciplines have been conducted to explain this phenomenon. Many recent studies agreed that international student mobility/migration is a complex phenomenon engaging multiple actors in various networks. These intertwined relations across various networks can influence international students' study abroad decisions. Therefore, explaining international student mobility should start from unravelling these complex relationships.

To begin, this study explored multiple dimensions of international student mobility/migration with theoretical explanations from different academic fields. Starting from traditional migration theories in economics and human capital theory in education, other relatively new theories such as imaginative geography and network theory were introduced. These theories inform us that international student migration decisions can be framed by multiple layers of networks and push/pull factors. In addition, historical relations between countries and structural advantages in the global higher education market can also shape students' perception of other countries, which can also influence their decisions on where to study.

The next section described the overall trend of international student flow at national, regional, and global levels with plots, summary tables, group comparisons, and correlations. Even though international student flow continued to increase between 1999 and 2017, the growth

distributions between countries were uneven particularly for inbound international students. The outflow has grown with diversified source countries while the inflow growth was rather restricted to traditionally popular destinations and a few emerging actors.

At the regional level, both intra and inter-region flow have grown fast in Europe and Asia. In both regions, regional organizations, EU and ASEAN have implemented regional initiatives to integrate and coordinate their higher education systems. Despite their efforts, the impact has been rather imbalanced and disproportionately advantaged a few countries in each region, specifically economically developed nations and Russia in Europe, and Malaysia in Southeast Asia.

At the country level, China has become a strong player with the biggest growth in both inbound and outbound college students because of economic growth and the central government's strategic policies. Other emerging actors include Malaysia and Saudi Arabia where national governments played a big role in expanding their market share in neighboring countries with favorable policies and educational hub strategies.

Correlation results showed that certain economic, education, and global engagement measures are associated with international student flow. In addition, the statistical significance of correlations between international student flow and two bilateral flow measures, migrant stock and trade indicates that bilateral relationship is also associated with the volume of international student flow.

A set of selected push and pull factors were empirically tested with a panel data regression approach. For pull models, economic development, higher gross enrollment ratio in tertiary education, a change to favorable immigration policies, and a greater number of intergovernmental organization memberships are all positively associated with a greater number

of inbound students. The subgroup analysis showed differences in pull factors between developed and developing nations. Cost factors are important for developed nations while educational factors are important for developing nations. For push models, only higher income level was statistically significant, which is positively related to more outflows. Also, results of subgroup analysis in push factors show that the number of college age population is only statistically significant for developing nations.

All these findings and discussions leave much room for further studies. First, in terms of methodological improvements, a gravity model approach can accommodate bilateral relationships of each pair of sending and receiving countries without needing to separate push and pull factors in different models. Also, causal relations between the volume of international student flows and policy variables of interest such as immigration and higher education policy or network effects can be addressed with quasi-experimental research designs (e.g., instrumental variables and differences-in-differences).

Second, for theoretical understandings, more collaborative effort is needed across academic disciplines to theorize international student migration and mobility that enables us to capture uniqueness and complexity of this phenomenon. As this study briefly introduced, scholars whose expertise is in human geography, sociology, international political economy, economics, and international higher education all contributed to explaining various aspects of international student mobility. Acknowledging that international student migration is embedded in multiple networks and various relationships, synthesizing studies from different fields will enhance our understanding of the phenomenon. Also, it allow us to address relevant issues such as how to better recruit, retain international students, and gauge impact of flows from and to revertant networks depending on target policies. Some scholars have already addressed the

importance of integrative knowledge in human migration studies (Brettell & Hollifield, 2014) and similar efforts are required in international student migration/mobility studies.

Third, although this study expanded the scope of analysis to the global level, more accurate and informative insights can be gained from research studies at the national level or other smaller units of analysis. The smaller unit approaches can reveal details that are not easily captured in simplified research designs with aggregate data. It should be noted that the complexity of international student migration and the existing heterogeneity of the phenomenon is not well described in previous empirical studies. One of the starting points for addressing this omission can include integrating national level studies to examine how different elements of the higher education system in a country interact each other, are connected to other networks, and shape the overall patterns. More importantly, policy issues of international student mobility can be better analyzed at a national level as two critical policies in international higher education, higher education and immigration policies are largely governed within national boundaries.

Fourth, non-traditional factors such as network effects and educational agents have become more important in recent years. Particularly, with increased competition of recruiting international students between institutions across countries and more uncertainty in rapidly changing environment, institutions partnered with non-traditional actors of international higher education for more commercial like activities. These non-traditional actors' engagement in the global higher education market and the networks they form to influence students' study abroad decisions should be a part of the description of international student migration.

Finally, but not least, all these investigations should begin with the most essential actors of the phenomenon, international students. Thorough understanding of their multiple identities,

transnational experiences, and networks will greatly enhance our analysis of the phenomenon and can resolve a key piece of the analytic puzzle.

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APPENDIX A

Data Definition, Data Source, and Coverage

Variable	Definition	Source	Coverage
Total Inbound Internationally Mobile Students, Both Sexes	Total number of students who have crossed a national or territorial border for the purpose of education and are now enrolled in tertiary institutions outside their country of origin.	UNESCO Institute for Statistics	Year: 1999~2017 Country: 70~111
Total Inbound Internationally Mobile Students, Both Sexes	Students who have crossed a national or territorial border for the purpose of education and are now enrolled outside their country of origin.	UNESCO Institute for Statistics	Year: 1999~2017 Country: 204~211
GDP, PPP	Gross domestic product (GDP) expressed in current international dollars, converted by purchasing power parity (PPP) conversion factor. GDP is the sum of gross value added by all resident producers in the country plus any product taxes and minus any subsidies not included in the value of the products. PPP conversion factor is a spatial price deflator and currency converter that eliminates the effects of the differences in price levels between countries.	World Bank	Year: 1999~2017 Country: 179~195

Purchasing power parity (PPP)	The total amount of goods and services that a single unit of a country's currency can buy in another country.	World Bank	Year: 1999~2017 Country: 176~195
GNI per capita, PPP (constant 2017 international $)	GNI per capita based on purchasing power parity (PPP). PPP GNI is gross national income (GNI) converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GNI as a U.S. dollar has in the United States. GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Data are in constant 2017 international dollars.	World Bank	Year: 1999~2017 Country: 172~192
Global Rankings	Global rankings of higher education institutions	Academic Ranking of World Universities, QS World University Rankings	Year: 2003~2017 Country: n of countries ranked on Top 200: 24~37 (the rest: not ranked)

Policy on highly skilled workers	Government's policy to influence the level of immigration of highly skilled workers into the country. Highly skilled migrants generally include highly qualified workers with post-secondary technical or professional education or job experience, especially with qualifications or skills in demand in the host country.	World Population Policies Database	Year: Every two years between 2005 and 2015 Country: 134 ~176
Gross enrolment ratio for tertiary education	Number of students enrolled in tertiary education, expressed as percentage of the 5-year age group immediately following upper secondary education. Note: The population of the official age for tertiary education is estimated to be the 5-year age group immediately following upper secondary education. If the official entrance age to upper secondary is 15 years and the duration is 3 years, then a is the age group 18-22 years.	UNESCO Institute for Statistics	Year: 1999~2017 Country: 81~134
Total number of IGO memberships	The number of memberships in intergovernmental organizations (international organizations that have at least 3 nation-states as their members)	The Correlates of War Project	Year: 1999~2014 Country: 185~193
International migrant stock, total	The number of people born in a country other than that in which they live. It also includes refugees. The data used to estimate the international migrant stock at a particular time are obtained mainly from population censuses.	United Nations Population Division	Year: Every five years between 1995 and 2015 Country: 199~202
School Age Population, Tertiary Education, Both Sexes (Number)	Population of the age-group theoretically corresponding to tertiary education as indicated by theoretical entrance age and duration	UNESCO Institute for Statistics	1999~2017 (Year) 142~202 (Country)

Unemployment, total (% of total labor force) (modeled ILO estimate)	Unemployment refers to the share of the labor force that is without work but available for and seeking employment.	International Labor Organization, ILOSTAT database	1999~2017 (Year) 178~182 (Country)
Trade (% of GDP)	The sum of exports and imports of goods and services measured as a share of gross domestic product	World Bank	1999~2017 (Year) 166~182(Country)
Population density (people per sq. km of land area)	Midyear population divided by land area in square kilometers. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin. Land area is a country's total area, excluding area under inland water bodies, national claims to continental shelf, and exclusive economic zones. In most cases the definition of inland water bodies includes major rivers and lakes.	World Bank	1999~2017 (Year) 198~205(Country)

APPENDIX B

Revised Push and Pull Models

(Scaled, excluding Outliers, and with an Alternative Indicator)

Table 31 Revised World Pull Models

	Dependent variable:				
	Log (Inflow/Population)				
	Basic	Network	High Skilled Policy	Global Engagement	Tertiary Enrollment
	(1)	(2)	(3)	(4)	(5)
Log (Purchasing Power Parity)	-0.109	0.140	0.083	-0.057	-0.106
	(0.115)	(0.219)	(0.181)	(0.186)	(0.108)
Log (GNI per capita)	7.064*	11.305***	5.040	4.390	11.962***
	(3.892)	(1.360)	(6.485)	(3.528)	(4.313)
Global Rankings	0.098	0.174*	-0.077	-0.032	0.135
	(0.115)	(0.096)	(0.173)	(0.092)	(0.120)
Log (GDP)	11.454	-8.425***	17.034	12.203	-3.581
	(8.573)	(2.772)	(14.311)	(7.978)	(10.845)
Log (Migrants)		2.595**			
		(1.231)			
High Skilled Immigration Policy (Raise)			0.222***		
			(0.063)		
Log (Total IGO memberships)				6.075**	
				(3.096)	
Trade (% of GDP)				0.382	
				(0.272)	
Log (Enrollment in Tertiary Ed.)					0.355*

					(0.200)
Constant		-6.317**			
		(2.475)			
Fixed effects (Country)	Yes	No	Yes	Yes	Yes
Observations	1,120	243	462	858	1,001
R^2	0.298	0.430	0.209	0.334	0.318
Adjusted R^2	0.233	0.417	0.004	0.259	0.253
F Statistic	108.606*** (df = 4; 1024)	175.993***	19.371*** (df = 5; 366)	64.368*** (df = 6; 771)	85.108*** (df = 5; 913)
Note:					*p**p***p<0.01

Table 32 Revised OECD Pull Models

	Dependent variable:			
	Log (Inflow/Population)			
	Basic	High Skilled Policy	Global Engagement	Tertiary Enrollment
	(1)	(2)	(3)	(4)
Log (GDP)	35.881***	30.216***	27.287***	38.824***
	(4.885)	(6.459)	(7.997)	(5.929)
Log (Purchasing Power Parity)	-0.198	-0.317*	-0.398*	-0.159
	(0.137)	(0.189)	(0.227)	(0.164)
Log (Annual Wage)	-0.210	4.070	1.329	-0.612
	(7.309)	(6.847)	(8.524)	(7.704)
Global Rankings	-0.119	-0.285*	-0.114	-0.161
	(0.088)	(0.161)	(0.081)	(0.112)
High Skilled Immigration Policy (Raise)		0.084*		
		(0.048)		
Log (The number of IGO memberships)			11.119**	
			(4.998)	
Trade (% of GDP)			0.162	
			(0.315)	

Log (Enrollment in Tertiary Ed.)				-0.032
				(0.423)
Fixed effects (Country)	Yes	Yes	Yes	Yes
Observations	395	170	333	338
R^2	0.484	0.432	0.487	0.481
Adjusted R^2	0.435	0.283	0.425	0.428
F Statistic	84.474^{***} (df = 4; 360)	20.360^{***} (df = 5; 134)	46.841^{***} (df = 6; 296)	56.676^{***} (df = 5; 306)
Note:				*p**p***p<0.01

Table 33 Revised OECD Pull Models with GNI per capita

	Dependent variable:			
	Log (Inflow/Population)			
	Basic	High Skilled Policy	Global Engagement	Tertiary Enrollment
	(1)	(2)	(3)	(4)
Log (GDP)	4.986	-2.520	2.317	-13.957
	(16.431)	(1.757)	(18.691)	(26.258)
Log (Purchasing Power Parity)	-0.393^{**}	-0.213^{*}	-0.338	-0.279^{*}
	(0.183)	(0.127)	(0.232)	(0.154)
Log (GNI pc)	11.112	15.796^{***}	8.809	20.738^{*}
	(7.313)	(1.925)	(7.408)	(10.590)
Global Rankings	-0.158	0.009	-0.139	-0.107
	(0.106)	(0.080)	(0.101)	(0.098)
Log (The number of IGO memberships)			8.939	
			(5.501)	
Trade (% of GDP)			0.313	
			(0.355)	
Year 2005	0.155^{**}		0.089	
	(0.078)		(0.084)	
Year 2006	0.131		0.068	

	(0.088)		(0.107)	
Year 2007	0.125		0.061	
	(0.111)		(0.141)	
Year 2008	0.082		0.012	
	(0.137)		(0.167)	
Year 2009	0.153		0.074	
	(0.147)		(0.182)	
Year 2010	0.256		0.199	
	(0.156)		(0.187)	
Year 2011	0.269*		0.152	
	(0.155)		(0.197)	
Year 2012	0.262		0.167	
	(0.163)		(0.205)	
Year 2013	0.257		0.175	
	(0.170)		(0.218)	
Year 2014	0.206		0.102	
	(0.184)		(0.245)	
Year 2015	0.238		0.161	
	(0.198)		(0.253)	
Year 2016	0.184			
	(0.206)			
Year 2017	0.159			
	(0.219)			
High Skilled Immigration Policy (Raise)		0.069		
		(0.045)		
Log (Enrollment in Tertiary Ed.)				0.154
				(0.250)
Constant		-14.702***		
		(2.747)		
Fixed effects (Country)	Yes	No	Yes	Yes
Fixed effects (Year)	Yes	No	Yes	No
Observations	409	176	345	352
R^2	0.559	0.465	0.535	0.549
Adjusted R^2	0.500	0.450	0.460	0.504

F Statistic	26.869^{***} (df = 17; 360)	149.337^{***}	20.041^{***} (df = 17; 296)	77.640^{***} (df = 5; 319)
Note:				$^{*}p^{**}p^{***}p<0.01$

Table 34 Revised Pull Models: Developed Nations

	Dependent variable:			
	Log (Inflow/Population)			
	Basic	High Skilled Policy	Global Engagement	Tertiary Enrollment
	(1)	(2)	(3)	(4)
Log (Purchasing Power Parity)	-0.273^{**}	-0.114	-0.235	-0.289^{**}
	(0.121)	(0.149)	(0.249)	(0.135)
Log (GNI per capita)	12.553^{**}	12.716^{*}	12.736^{***}	13.083^{***}
	(5.723)	(7.408)	(2.666)	(3.558)
Global Rankings	-0.140^{**}	-0.183	-0.039	-0.083
	(0.063)	(0.123)	(0.055)	(0.072)
Log (GDP)	5.310	2.386	0.718	3.377
	(14.462)	(17.021)	(2.473)	(6.923)
High Skilled Immigration Policy (Raise)		0.106^{**}		
		(0.053)		
Log (Total IGO memberships)			0.789	
			(2.192)	
Trade (% of GDP)			0.222	
			(0.228)	
Log (Enrollment in Tertiary Ed.)				-0.170
				(0.272)
Constant			-15.546^{***}	-17.530^{***}
			(3.064)	(3.742)
Fixed effects (Country)	Yes	Yes	No	No
Observations	566	233	476	506
R^2	0.509	0.456	0.440	0.502

Adjusted R^2	0.465	0.322	0.433	0.497
F Statistic	134.402^{***} (df = 4; 519)	31.230^{***} (df = 5; 186)	368.424^{***}	504.133^{***}
Note:				$^{*}p^{**}p^{***}p<0.01$

Table 35 Revised Pull Models: Developing Nations

	Dependent variable:			
	Log (Inflow/Population)			
	Basic	High Skilled Policy	Global Engagement	Tertiary Enrollment
	(1)	(2)	(3)	(4)
Log (GDP)	0.627	-1.499	12.601	-18.784^{**}
	(3.738)	(3.717)	(10.288)	(8.126)
Log (Purchasing Power Parity)	0.196	0.438	0.030	0.223
	(0.198)	(0.304)	(0.254)	(0.161)
Log (GNI per capita)	7.843^{***}	7.422^{***}	1.071	12.484^{***}
	(2.744)	(2.084)	(5.087)	(2.682)
Global Rankings	0.397^{**}	0.016	0.133	0.410^{**}
	(0.184)	(0.236)	(0.221)	(0.161)
High Skilled Immigration Policy (Raise)		0.331^{*}		
		(0.195)		
Log (Total IGO memberships)			10.746^{**}	
			(5.290)	
Trade (% of GDP)			0.418	
			(0.462)	
Log (Enrollment in Tertiary Ed.)				0.606^{**}
				(0.260)
Constant	-9.664^{***}	-6.709^{**}		5.366
	(3.746)	(3.154)		(7.609)
Fixed effects (Country)	No	No	Yes	No
Observations	554	229	382	495
R^2	0.212	0.161	0.282	0.279
Adjusted R^2	0.206	0.142	0.188	0.271

F Statistic	145.716^{***}	40.716^{***}	22.023^{***} (df = 6; 337)	187.221^{***}
Note:				*p**p***p<0.01

Table 36 Revised Push Models

	Dependent variable:		
	Log (Outflow/Population)		
	World	Developed	Developing
	(1)	(2)	(3)
Log (GNI per capita)	5.559^{***}	7.975^{**}	3.797^{**}
	(1.419)	(3.203)	(1.746)
Log (# of Total IGO memberships)	5.032^{***}	1.664	6.946^{***}
	(1.666)	(2.193)	(1.889)
Trade (% of GDP)	-0.013	0.268	-0.188
	(0.150)	(0.232)	(0.193)
Log (Population Density)	-0.581	-2.881	-1.274
	(0.958)	(3.536)	(1.002)
Unemployment	0.005	0.007	0.003
	(0.005)	(0.007)	(0.009)
Political Stability	-0.018	-0.015	-0.033
	(0.040)	(0.088)	(0.047)
Log (Enrollment in Tertiary Ed.)	0.008	0.126	-0.054
	(0.073)	(0.108)	(0.083)
Year 2001	0.041	-0.001	0.049
	(0.039)	(0.054)	(0.061)
Year2003	0.097^{*}	-0.010	0.168^{**}
	(0.054)	(0.086)	(0.077)
Year2004	0.032	-0.137	0.159^{*}
	(0.063)	(0.101)	(0.085)
Year 2005	-0.017	-0.189	0.120
	(0.073)	(0.131)	(0.097)

Year 2006	-0.040	-0.225	0.117
	(0.083)	(0.153)	(0.112)
Year 2007	-0.068	-0.286	0.113
	(0.096)	(0.184)	(0.129)
Year 2008	-0.079	-0.321	0.134
	(0.105)	(0.206)	(0.142)
Year 2009	-0.090	-0.332	0.127
	(0.115)	(0.230)	(0.157)
Year 2010	-0.059	-0.251	0.141
	(0.114)	(0.225)	(0.159)
Year 2011	-0.085	-0.278	0.123
	(0.123)	(0.253)	(0.171)
Year 2012	-0.099	-0.313	0.121
	(0.131)	(0.273)	(0.184)
Year 2013	-0.115	-0.346	0.122
	(0.138)	(0.289)	(0.196)
Year 2014	-0.140	-0.390	0.118
	(0.144)	(0.308)	(0.206)
Year 2015	-0.097	-0.392	0.204
	(0.149)	(0.321)	(0.210)
Fixed effects (Country)	Yes	Yes	Yes
Fixed effects (Year)	Yes	Yes	Yes
Observations	1,433	577	856
R^2	0.430	0.526	0.431
Adjusted R^2	0.375	0.471	0.367
F Statistic	46.914^{***} (df = 21; 1305)	27.289^{***} (df = 21; 516)	27.741^{***} (df = 21; 768)
Note:			*p**p***p<0.01