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Essays on Financing Systems of Student Mobility in Higher Education: an Economic Analysis

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Essays on Financing Systems of Student Mobility in Higher Education: an Economic Analysis

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Recent literature on financing student mobility indicates that existing systems are often inefficient, producing both positive and negative externalities for the countries involved. This is particularly disadvantageous for developing “sending” countries, which often pay scholarship fees to their students to study abroad, under the false hope of seeing those students return once they have completed their studies. This study aims to enhance understanding of financing systems for student mobility, introducing the reader to a comprehensive literature review. It analyses and evaluates student mobility through statistics and institutions, offering recommendations for higher education policy. Furthermore, it proposes extending the analysis of the current literature into alternative models. It presents a new approach and analyses its mechanism design: a return-contingent scholarship set up by Ecuadorian educational authorities.

Alice Sanna (Italy, 1984) holds a master's in economics from the University of Cagliari (Italy) and a research master's in economics from the University of Louvain (Belgium). From 2012 to 2022, she worked as a research and teaching assistant in economics at the Institute of European Studies (UCLouvain) and as a pedagogical assistant for students with disabilities at PEPS'in (UCLouvain). Between 2015 and 2025, she has been a researcher at the University of Louvain (LouRIM, LiDAM/CORE) in the fields of education and taxation. She is currently a postdoctoral fellow in economics at the University of Cagliari (CRENoS).

To the memory of Professor Marcel Gérard

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Abstract

In today's globally competitive landscape for talent, higher education is viewed not only as a cultural asset but also as an economic driver, playing a vital role in economic development and growth by fostering human capital, stimulating innovation, and enhancing productivity. In line with the increasing number of students enrolled in tertiary education, the number of international students is rising worldwide. Some of these students choose to remain in the host country where they studied, leading to brain drain or, at the very least, brain circulation. This situation poses significant challenges for developing nations, as it entails the emigration of skilled individuals who do not return to their country of origin. Recent literature on financing student mobility indicates that existing systems are often inefficient, producing both positive and negative externalities for the countries involved. This is particularly disadvantageous for developing "sending" countries, which often pay scholarship fees to their students to study abroad, under the false hope of seeing those students return once they have completed their studies. This study aims to enhance understanding of financing systems for student mobility, introducing the reader to a comprehensive literature review. It analyses and evaluates student mobility through statistics and institutions, offering recommendations for higher education policy. Furthermore, it proposes extending the analysis of the current literature into alternative models. It presents a new approach and analyses its mechanism design: a return-contingent scholarship set up by Ecuadorian educational authorities. The institutional data shows a return rate of 90%. By combining theoretical and empirical methods based on an original survey analysis demonstrating a similar return rate, this study aims to gain a deeper understanding of the impact of the Ecuadorian return-contingent scholarship, among other factors, on the decision of Ecuadorian students to stay abroad after their studies.

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Introduction

1. Motivation

This work builds on and draws from two interconnected areas of research: economics of education and higher education studies.

The economics of education refers to the application of economic principles, concepts, and methods to analyse education as an economic phenomenon. It examines how education systems impact labour market outcomes, economic growth, and individual decision-making, often highlighting the role of incentives, funding mechanisms, and human capital development. The connection between education and earnings is not new, with its roots in the writings of classical economists. For instance, Smith (1776) recognised, in some way, education as an investment in human capital, acknowledging that productivity and growth relied not just on equipment and land, but on the knowledge and abilities of individuals in society. Nearly two centuries later, Schultz (1961) demonstrated how education contributes to economic expansion. In the same period, in his human capital theory, Becker (1964) posits that education functions as an investment in individual productivity, influencing labour market outcomes through enhanced skills and work experience. Rosen (1976) expanded human capital theory by showing how skills and specialisation impact lifetime earnings and economic outcomes. Woodhall (1987) thoroughly analysed the economics of education, including its contribution to economic growth, the profitability of investment, the role of skilled workers, the cost of education, and its financing. Psacharopoulos and Woodhall (1985) discussed how research and experience in analysing the economic aspects of investment choices can help identify priorities for education investment. Hanushek (2015) focuses on educational quality, which, when combined with cognitive skills, plays a crucial role in determining labour market success and national economic growth, as it significantly impacts individual earnings and productivity.

Higher education studies, while sharing some concerns with the economics of education, such as access, quality, and outcomes, also takes a broader institutional and policy-focused approach, often incorporating sociological and political aspects. Bok (2015), for example, extensively discussed higher education financing, highlighting the financial pressures universities face, including competition for talent. Altbach (2004) and Altbach and Knight (2007) examine the globalisation of higher education, highlighting how universities function within an unequal global context, where internationalisation presents both opportunities and challenges, including issues of access, quality, and the tension between global trends and local concerns realities. Marginson (2006) adopts a broader institutional and policy-focused approach to higher education, highlighting how governance, state policies, and market forces shape university systems. This approach combines sociological and political perspectives to analyse how higher education institutions respond to pressures regarding autonomy, accountability, and quality assurance in changing national and global contexts.

Within the field of economics of education, this research explores key themes, including education financing, incentives, and public policy in higher education. In particular, it examines the economic implications of student migration for both sending and receiving countries, highlighting the inefficiencies and externalities resulting from current funding mechanisms. Moreover, it contributes to broader debates on educational policies in higher education, particularly in emerging economies. By analysing an Ecuadorian return-contingent scholarship policy, this work examines its institutional design aimed at reducing brain drain and maximising the return on public investment in higher

education. At the same time, this work enriches higher education studies by focusing on the internationalisation of higher education and the student experience within cross-border academic mobility. Through a mixed-methods approach that combines institutional data and survey analysis, the study offers new insights into brain drain issues, particularly in understanding what motivates students' decisions to stay abroad or return home. In doing so, it informs discussions on global talent flows, the strategic aspects of scholarship programmes, and the design of student mobility policies that balance individual aspirations with national development priorities.

More specifically, this research examines the funding systems of international student mobility and their impact on brain drain, with a focus on the design and effectiveness of a scholarship program that requires students to return home after studying abroad. Through a detailed literature review, institutional analysis, and an original empirical survey, it assesses the role of such programs in alleviating brain drain and addressing key challenges faced by sending countries. By combining different approaches, this research seeks to provide evidence-based insights for policy design in both the economics of education and higher education policy sectors.

2. Literature Review

In the current context of global talent competition, higher education is regarded not only as a cultural asset but also as an economic one, contributing significantly to economic development and growth through human capital formation, innovation, and increased productivity (Aghion and Howitt, 2009; Zhu et al., 2017). Despite the challenges on estimating this contribution (Anselin et al., 1997), this has been empirically confirmed by various scholars (Mansfield, 1991; Arbo and Benneworth, 2007; Kenney and Mowery, 2014). Universities and research institutions are vital in fostering innovation, entrepreneurship, and economic progress. Investment in higher education leads to sustained social and economic advancement (Psacharopoulos and Patrinos, 2018) by equipping the workforce with essential skills and stimulating innovation. This is particularly true for engineering and scientific fields crucial for technological advancement (Chen and Dahlman, 2006). Valero and Reenen (2019) noted that universities serve as powerful economic growth and innovation engines by preparing the future workforce and generating new knowledge that propels industries and economies forward. Therefore, as social and economic progress is predominantly achieved through the advancement and application of knowledge, tertiary education is essential for creating, disseminating, and applying knowledge and building technical and professional capacity (Court et al., 2002).

The current literature on student and graduate mobility highlights the relationship between these two forms of human capital movement: many scholars show that students studying overseas are more likely to work abroad (Bracht et al., 2006; Di Pietro, 2012; Knutsen et al., 2024; Parey and Waldinger, 2011). In her work based on European countries, Rodrigues (2013) argues that “student mobility is associated with a significant increase in the probability to be mobile after graduation, and this effect is larger the more time is spent abroad” (see also Pinto, 2020). Studying abroad offers advantages in terms of international networking, cultural exposure, and enhanced language skills, which can improve graduates' employability overseas. The experience of living and studying in another country may influence their career choices, making them more inclined to seek employment in international or foreign markets (Kratz and Netz, 2016). Additionally, Teichler (2017) emphasised that short-term mobility leads to substantial international skills and, consequently, to frequent international career mobility.

In recent years, with the growing number of students enrolled in higher education, the number of mobile students has also significantly risen. According to UNESCO (2022), it tripled from 2000 to 2019, with the share of total world enrolments rising from 2.09% to 2.58%. A considerable percentage of these mobile students choose to stay in the country where they studied (OECD 2022), contributing

to the phenomenon known as brain drain, which has captured the attention of many scholars over the last decade. Brain drain is particularly disadvantageous for developing countries, where the need for highly skilled workers and highly educated citizens is more significant than in developed countries (Beine et al., 2008; Borjas, 1994).

Countries are now competing to attract bright students who have gone abroad and to retain top scholars who have come to their territories for postgraduate education. To do so, it is essential to consider how they approach student mobility effects in their policies for financing and hosting international students. The systems that finance student mobility in higher education are often inefficient, leading to positive and negative externalities (Gérard and Uebelmesser, 2014; Altbach, 2004). Along the same line, Perkins and Neumayer (2013) discuss the risks of producing graduates who are more likely to remain in host countries, aggravating talent shortages in sending countries. In a similar vein, Altbach (2013) examines the intricate dynamics of international mobility and how it affects higher education. He underscores the necessity for policies that tackle the discrepancies caused by brain drain while encouraging a more equitable exchange of intellectual resources.

In the literature, we can distinguish two central financing systems for student mobility: the host-country principle and the country-of-origin principle (Gérard 2007, 2008, 2012). In the first model, the higher education costs are covered by local tax revenue. In the second model, the country of origin finances the studies abroad. While less inefficient than the previous model, this model often involves sending countries paying scholarship fees for their students to study overseas, with the false hope that they will return after completing their studies. As a result, it still encourages brain drain.

One proposed solution to address these issues has been the Bhagwati tax. The tax is designed to address the global inequality in labour mobility and compensate poorer countries for their investments in education. However, implementing this tax presents challenges and entails significant administrative costs. Additionally, it may create disincentives for education and mobility, as individuals might anticipate having to pay a tax on their future earnings abroad (Docquier and Rapoport, 2012). The literature (Kemple and Snipes, 2000; Barr, 2004; Chapman and Ryan, 2002; Chapman, 2006) extensively examines income-contingent loans as a viable alternative to address inefficiencies, analysing their design, economic implications, equity effects, and administrative feasibility. These loans link repayment to future income levels and are designed to adjust based on students' earnings post-graduation. Income-contingent loans can enhance the effectiveness of student financing systems by mitigating financial risk and increasing accessibility to higher education for a broader range of students (Chapman, 2006). Nonetheless, implementing such a system is complex due to the challenges and costs associated with the administration involved in establishing and maintaining it across international or cross-border contexts (Chapman, 2006; Woodhall, 2004; Barr, 2004). Moreover, tracking income across countries with differing tax structures and labour market conditions can be exceedingly challenging. These complexities are particularly pronounced in developing countries where administrative capacity may be limited.

In their work, Gérard and Uebelmesser (2014) assessed how well current devices internalise cross-border spillover effects, measured by their proximity to an efficient benchmark, analysing in detail the benefits and costs for the origin, host and destination countries according to the different financing systems of student mobility: host-country principle, origin-country principle and Bhagwati tax or Contingent loan, which can be seen as variants of the origin-country principle. The presence of international students brings several benefits to the country they study in, including their contribution to the local economy, whether they decide to stay after graduation or return to their home country. They also make local expenditures during their stay, boosting the host country's economy. Another advantage is the "missed opportunity cost", which is often overlooked. Indeed, during their period of tertiary education, students do not belong to the workforce of their country of origin. There are also

costs involved, such as the expenses of providing higher education to these students and possible compensation to their home country. The lack of consideration for these benefits and costs in the decision-making process leads to inefficiencies and can result in at least one country free-riding. Therefore, there is a place and a need for alternative designs.

3. Higher Education's Numbers

Higher education has recently become a topic of great interest among scholars. This is primarily due to its significant impact on the growing number of students and its crucial connection to skilled labour in various industries.

The global population has shown a consistent upward trend, substantially increasing the number of students pursuing education. In the year 2000, the total enrolment stood at approximately 101,263,571 students. Over the course of the following decade, this number almost doubled, reaching 180,771,148 in 2010. As of 2022, the enrolment is estimated at 254,323,818 students. This substantial growth underscores the increasing importance of tertiary education worldwide.

Table 1.1 displays the top 10 countries ranked by the number of students enrolled in tertiary education in 2021. The enrolment numbers in tertiary education are significantly high in Asian middle-income countries, with China having 53,823,026 enrolments and India with 38,870,062 enrolments. These two countries alone represent more than one-third (38%) of all students in higher education. Among Latin American countries, Brazil has 9,312,309 enrolments, Mexico has 4,983,206, and Argentina has 3,731,692, together accounting for 8% of global enrolment. Additionally, Indonesia has 4% of the total enrolment, while Turkey, Russia, Bangladesh, and Japan each have 3%, 2%, 2%, and 2% respectively.

Table 1.1 Countries ranked by enrolment in tertiary education (top 10), year 2021

COUNTRY	N. STUDENTS ENROLLED IN TERTIARY EDUCATION	PERCENTAGE OF WORLD ENROLMENT
<i>CHINA</i>	53,823,026	22%
<i>INDIA</i>	38,870,062	16%
<i>BRAZIL</i>	9,312,309	4%
<i>INDONESIA</i>	8,992,031	4%
<i>TURKEY</i>	8,280,595	3%
<i>MEXICO</i>	4,983,206	2%
<i>RUSSIA</i>	3,969,619	2%
<i>BANGLADESH</i>	3,879,939	2%
<i>JAPAN</i>	3,879,086	2%
<i>ARGENTINA</i>	3,731,692	2%

Source: authors' calculations from UIS data.

4. A Look at International Student Mobility

Let us now dive into the analysis of worldwide student mobility. Although UIS data, the basis of our analysis, is available for educational matters until 2022, complete data for student mobility is only available until 2018.

Table 1.2 shows the distribution of international students across different world regions.

Table 1.2 Student mobility in tertiary education by region, year 2018

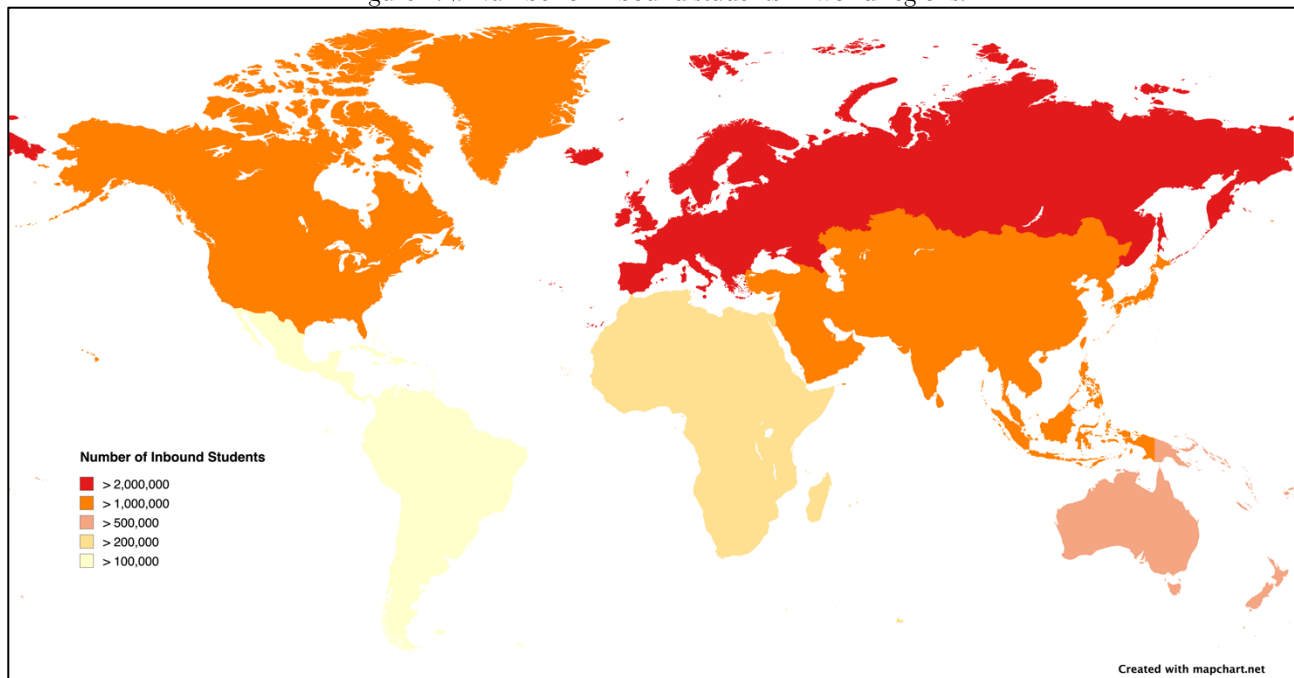
	INBOUND	% TOT	OUTBOUND	% TOT	INBOUND- OUTBOUND
<i>EUROPE</i>	2,214,161	40%	1,000,620	18%	1,213,541
<i>ASIA</i>	1,225,253	22%	3,389,413	62%	2,164,160
<i>NORTHERN AMERICA</i>	1,211,931	22%	134,294	2%	1,077,637
<i>OCEANIA</i>	505,155	9%	31,047	1%	474,108
<i>AFRICA</i>	224,480	4%	558,320	10%	-333,840
<i>LATIN AMERICA AND CARIBBEAN</i>	190,423	3%	356,208	7%	-165,785

Source: authors' calculations from UIS data.

Europe has the highest number of inbound students, hosting 2,214,161 students, representing 40% of the total. Asia follows with 1,225,253 students (22%), and North America with 1,211,931 students (almost 22%). Oceania hosts 505,155 students (9%), while Africa and Latin America and the Caribbean together receive 414,903 students, representing 7% of the total. For a more comprehensive view of the global situation, Figure 1.2 and Figure 1.3 present details on inbound and outbound students across different regions in a map chart.

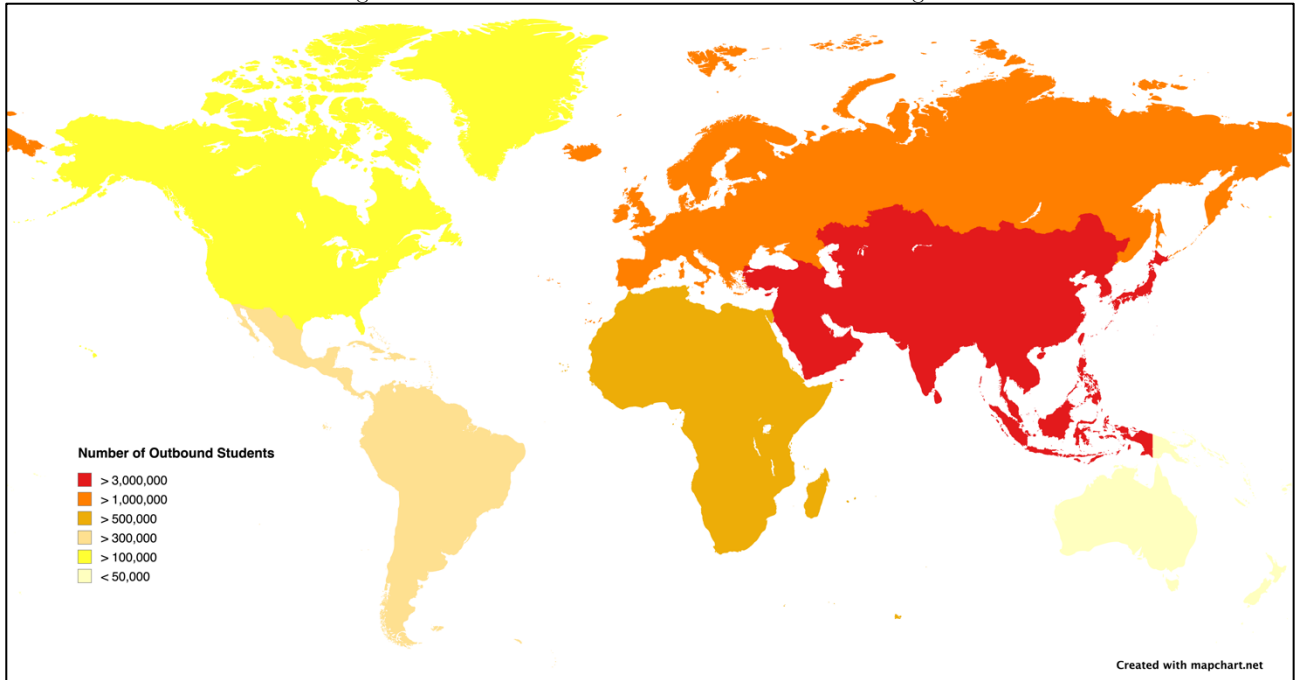
In Table 1.2, we notice that Asia is the region exporting the most outbound students, accounting for 62% of the total (3,389,413), followed by Europe at 18% (1,000,620) and Africa at 10% (558,320).

Figure 1.2. Number of Inbound students in world regions.



Source: authors' elaboration from UIS data.

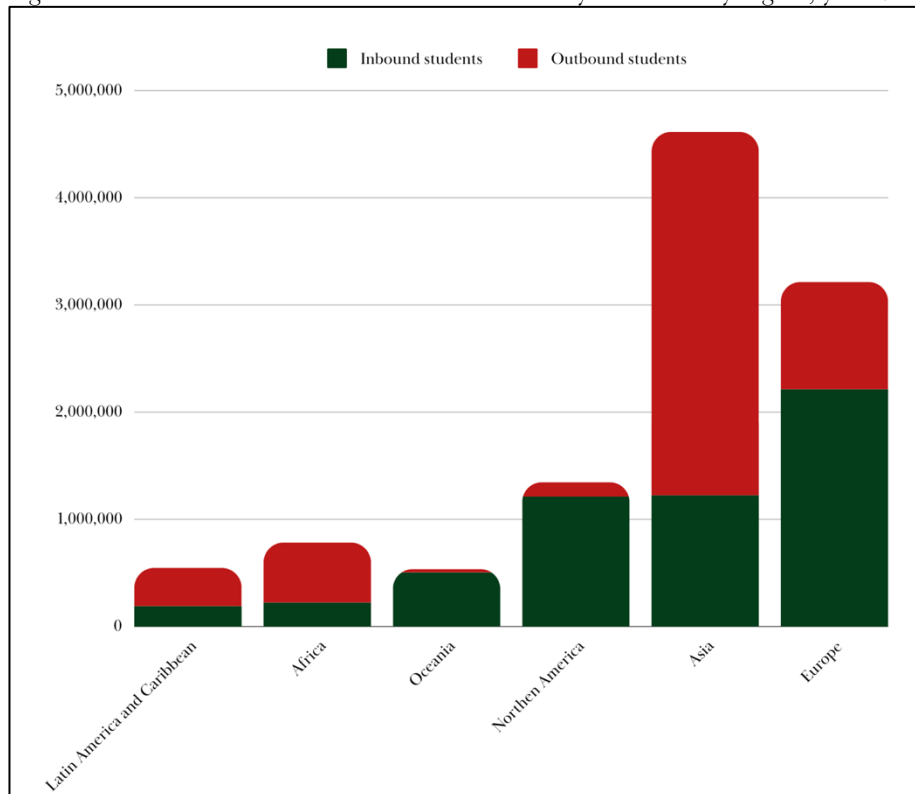
Figure 1.3. Number of Outbound students in world regions.



Source: authors' elaboration from UIS data.

Figure 1.4 compares the information in the last column of Table 1.2 about the number of inbound and outbound students in the same region. Figure 1.5 synthesizes this information, offering insights into whether the region serves as a net importer or exporter of mobile students.

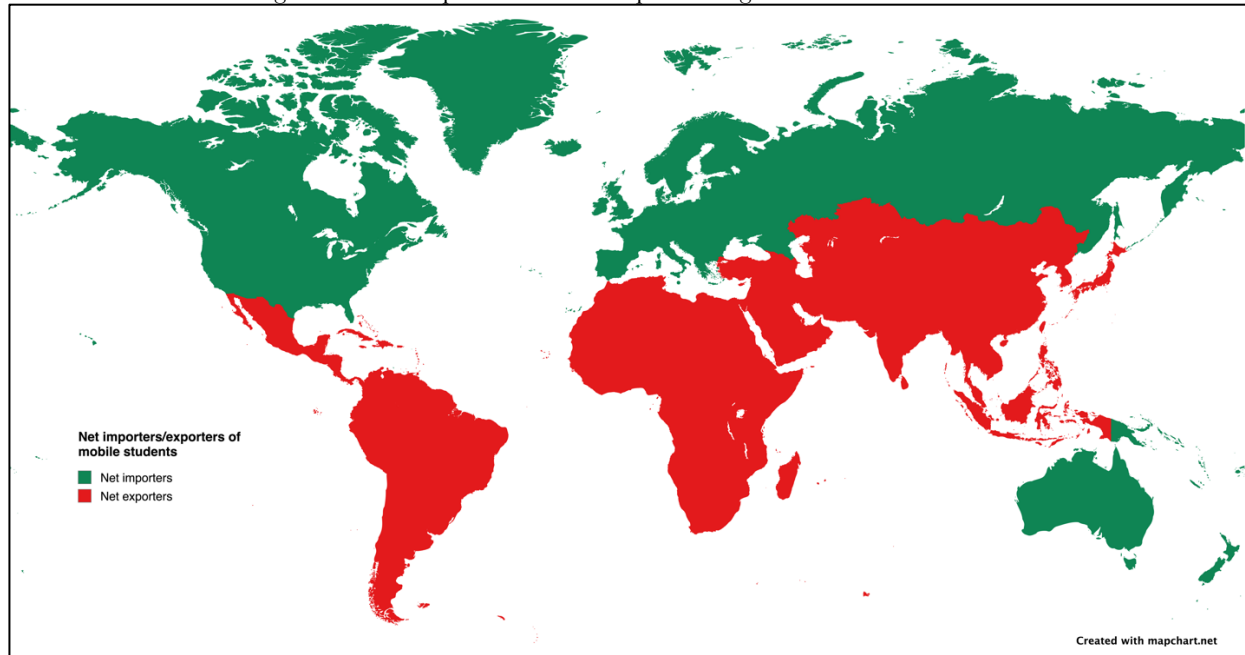
Figure 1.4 Inbound and Outbound students in tertiary education by region, year 2018



Source: authors' elaboration from UIS data.

In the former scenario (net importer), the region imports more students than it exports (inbound > outbound). In the latter scenario (net exporter), it imports fewer students than it exports (inbound < outbound). As we can see, Europe, Northern America, and Oceania are net importers, while Asia, Latin America, and Africa are net exporters. This aligns with the quality of higher education in these regions, where the countries mostly belong to the lower-middle-income or lower-income class.

Figure 1.5 Net importers and net exporters regions of mobile students.



Source: authors' elaboration from UIS data.

Regarding country-level distribution, Table 1.3. provides insights into the top ten countries with the highest number of inbound and outbound students.

Table 1.3 Inbound and Outbound students in tertiary education by country (top 10), year 2018.

INBOUND		OUTBOUND	
<i>USA</i>	987,314	<i>CHINA</i>	993,367
<i>UK</i>	452,079	<i>INDIA</i>	375,055
<i>AUSTRALIA</i>	444,514	<i>GERMANY</i>	122,538
<i>GERMANY</i>	311,738	<i>VIETNAM</i>	108,527
<i>RUSSIA</i>	262,416	<i>SOUTH KOREA</i>	101,774
<i>FRANCE</i>	229,623	<i>FRANCE</i>	99,488
<i>CANADA</i>	224,548	<i>USA</i>	84,349
<i>JAPAN</i>	182,748	<i>KAZAKHSTAN</i>	83,503
<i>CHINA</i>	178,271	<i>NEPAL</i>	81,917
<i>TURKEY</i>	125,138	<i>SAUDI ARABIA</i>	77,406

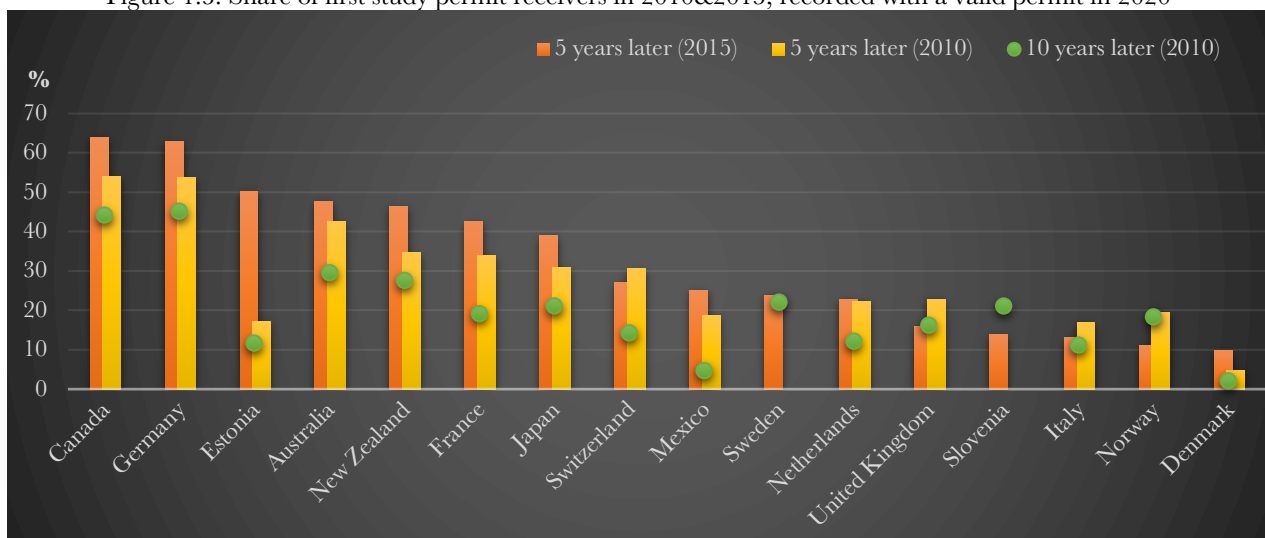
Source: authors' calculations from UIS data.

The country with the most inbound students is the USA (987,314, representing 80% of the region and 18% of the total incoming students), followed by the UK (452,079, representing 20% of the region and 8% of the total), Australia (444,514, representing 88% of the region and 7% of the total), and Germany (311,738, representing 14% of the region and 6% of the total). Other countries with significant inbound student numbers include Russia (262,416), France (229,623), Canada (224,548), Japan (182,748),

China (178,271), and Turkey (125,138). Regarding outbound students, the top ten countries with the highest number of outgoing students are China (993,367, representing 30% of the region and 18% of the total outbound students), India (375,055, representing 11% of the region and 6% of the total), Germany (122,538, representing 12% of the region and 2% of the total), and Vietnam (108,527, representing 3% of the region and 2% of the total). Following them are South Korea (101,774), France (99,488), the USA (84,349), Kazakhstan (83,503), Nepal (81,917), and Saudi Arabia (77,406).

Let us now shift our focus to the outbound international students. Do these students remain overseas after completing their studies? According to the OECD (2022)¹, despite differences among countries, around 30% of international students who were granted permits for study purposes in 2015 still reside in the host country 5 years later. This rate drops 10 years later in most countries, but remains at almost 50% in English-speaking countries and Germany. See Figure 1.3 for details.

Figure 1.3. Share of first study permit receivers in 2010&2015, recorded with a valid permit in 2020



Source: OECD (2022) and authors' calculations

In Table 1.4, we can see the estimated percentage of students who changed their education permit to a working permit in 2019, based on the average annual education permits issued from 2016 to 2018. According to the literature, Canada (83%), Australia (68%), Germany (50%), and New Zealand (50%) have the highest percentage of students transitioning from education permits to working permits. Finland, Luxembourg, Slovenia, France, and Estonia fall in the range of one-third to one-half, indicating a moderate transition rate. Other countries also have a significant retention rate, with less than one-third transitioning. Mexico, Greece, Portugal, and Spain show low retention rates.

The United States has a low retention rate of only 19% compared to other sources. This difference may be due to the criteria used to measure the retention rate. While other sources consider whether a student stays after completing their studies, this low rate in the United States could be linked to the difficulty of obtaining a work permit (which is the condition for changing the educational one).

Please note that this information has some limitations. Firstly, the criteria for measuring retention rates vary across OECD countries (refer to Table 1 in the Appendix for more details). Secondly, the starting point for analysis is the first study permit, and since many countries do not link subsequent individual permits, estimations cannot follow the individual line but only look at transitions to other categories.

¹ See also Felbermayr and Reczkowski (2014) and Van Bouwel and Veugelers (2014).

Additionally, permit statistics provide an indication of a person's presence in a country as an approximation of actual stay; however, many countries do not distinguish between degree students and exchange or language students.

Table 1.4 Estimated share of education permits changed into a working permit.

COUNTRY	%	COUNTRY	%
<i>MEXICO</i>	11	<i>BELGIUM</i>	27
<i>HUNGARY</i>	12	<i>IRELAND</i>	29
<i>AUSTRIA</i>	15	<i>SWEDEN</i>	29
<i>GREECE</i>	16	<i>OECD AVERAGE (26)</i>	30
<i>PORTUGAL</i>	16	<i>FINLAND</i>	32
<i>SPAIN</i>	17	<i>LUXEMBOURG</i>	38
<i>LATVIA</i>	18	<i>SLOVENIA</i>	40
<i>UNITED STATES</i>	19	<i>FRANCE</i>	41
<i>POLAND</i>	20	<i>ESTONIA</i>	46
<i>DENMARK</i>	22	<i>NEW ZEALAND</i>	50
<i>ICELAND</i>	23	<i>GERMANY</i>	50
<i>SLOVAK REPUBLIC</i>	24	<i>AUSTRALIA</i>	68
<i>NORWAY</i>	25	<i>CANADA</i>	83
<i>NETHERLANDS</i>	26		
<i>JAPAN</i>	26		

Source: OECD (2022) and authors' computation

In this brief data analysis of student mobility in higher education, we can draw two important intuitions. First, the countries that import more students and are net importers are English-speaking countries, which tend to have the highest retention rates. Second, most net exporting countries are lower-middle-income or lower-income countries. When students studying abroad choose to stay in the host country or move to a third country, it results in a significant brain drain for these nations.

Starting from this, it is easy to see that while it may not be convenient for any country to adopt a country-of-origin principle full scholarships when funding students to study abroad, it is especially inconvenient for developing countries. This is because the likelihood of students staying abroad is higher due to better conditions overseas.

It is worth noting that even though Europe is a net importer of mobile students, it also experiences brain drain (or, at least, brain circulation) due to the proportion of students going to English-speaking countries.

5. Financing Higher Education and Mobility: The Numbers

The role of public spending in tertiary education is key. Due to the market's failures (externalities, information asymmetry and monopoly power), public intervention in tertiary education is warranted. However, the literature suggests a need to increase private funding, as limited public funding may lead to a rationing of the number of students or spending levels per student. This situation could jeopardise the quality of teaching and the acquisition of skills by students (EC, 2013).

As stated by UNESCO (2022), relying on Williams' and Usher's (2022) work, in 2018, Europe and Northern America accounted for 49% of global higher education spending. Public spending per student globally increased by 7%, reaching USD 4,758. Europe and Northern America saw a 36% increase in spending per student, reaching USD 10,541 in 2018. Eastern and South-Eastern Asia's

share of global spending increased from 17% in 2006 to 25% in 2018, with a 56% growth per student, reaching USD 3,509 in 2018.

Data on public versus private financing of higher education is not comprehensive. Although estimates for private financing are unreliable, Williams' and Usher's (2022) argue that between 2006 and 2018, the public financing of public HEIs was greater than the increase in private financing.

Higher education and student mobility can be financed through students' own resources (from family resources or "student jobs") or through grants and loans. Regarding student funding, the same sources state that between 2006 and 2018, direct SFA disbursements grew by 75% in 48 countries. In 2018, the average higher education student loan was worth USD 7,803, whereas the average grant was only USD 2,608. Grant coverage increased from 2011 to 2016, reaching 19.5% in 2018.

In the 2023 report, Eurydice categorises 37 countries of the EHEA (European Higher Education Area; 10 out of the 27 belonging to the European Union) based on the portability of student support.² The portability of student support can be distinguished into five categories: full portability for credits and degree mobility across the EHEA; portability for credits and degree mobility but with some restrictions; full portability for credit mobility without restrictions but portability for degree mobility with some restrictions; portability for credits with some restrictions but no portability for a degree; no portability.

Most European Union countries have mechanisms for grants and loans, with full credit and degree portability, albeit with some loan restrictions with no publicly subsidised loans (Norway, Sweden, Finland, Netherlands, Slovenia, Cyprus, Luxembourg, Belgium, Ireland, France, Denmark, Germany, Austria, Estonia and Malta). Some countries (Poland, Czech Republic, Slovakia, Hungary, Croatia and Italy) have full credit mobility portability and lack most support for degree mobility. The rest of the countries have some restrictions on both. For more details, see Table 2 in the Appendix.

Despite portability, grant eligibility depends on criteria based on socioeconomic conditions and students' performance. Only Scandinavian countries (namely Denmark, Finland, and Sweden) have an inclusive system that does not depend on socioeconomic conditions or academic performance. Others require minimum criteria. The current grants available to students can only benefit a small percentage, as they do not provide enough support to cover all mobility costs. According to EIF (2014) and EC (2020), the existing grants are insufficient to achieve the Bologna process's goals, which aim to increase student mobility across the EHEA.

6. Contribution and Structure

This study aims to enhance the understanding of financing systems for student mobility by introducing the reader to a comprehensive literature review. It analyses and evaluates student mobility through statistics and institutions, offering recommendations for higher education policy. Furthermore, starting from the analysis presented above and particularly focusing on issues of brain drain and the inefficiencies of the funding systems discussed in the literature, the project aims to explore a new alternative tool for financing systems for student mobility, analysing its mechanism design while assessing its effects with the expectation of enriching the existing literature. In particular, it introduces a novel return-contingent scholarship device that the Republic of Ecuador implemented to address the brain drain. This programme provides funding for students who plan to study abroad, with the

² EHEA countries are 49, but no data is available for all.

condition that they return to their home country and work there for twice the duration of their time abroad. Students who fail to meet this requirement face a penalty, i.e., repaying the total scholarship cost plus interest. Statistics indicate a return rate of about 90%. By combining theoretical and empirical methods based on an original survey analysis that demonstrates a similar return rate, this study aims to gain a deeper understanding of the impact of the Ecuadorian return-contingent scholarship, among other factors, on the decision of Ecuadorian students to return to Ecuador after completing their studies.

The research question can be articulated as follows: What roles do the current financing systems of student mobility in higher education play within the existing framework of the talent war, and are there any viable alternatives? The three chapters of this work aim to explore answers to these questions. The goal is to make the research more accessible to a wider audience and to offer strategic recommendations for policymakers and various stakeholders in higher education.

Let us now turn to the structure of the work. This project consists of three essays, each of which can be read independently.

The first essay, co-authored with Marcel Gérard and published in 2017, is entitled “*Student Mobility at a Glance: Efficiency and Equality in the Face of Brain Drain and Brain Gain*”.³ It provides an overview of financing systems for student mobility, introducing the reader to an ample literature review. It analyses and evaluates student mobility through statistics and institutions and offers recommendations for higher education policy. Moreover, it suggests ideas for a research agenda, including the possibility of extending the analysis of the present literature into alternative models, preparing then the groundwork for the other essays.

The second essay, published in 2022, is entitled “*Fighting Brain Drain: The Ecuadorian Scholarship*” and presents a case study on the financing systems of student mobility in literature.⁴ It provides an overview of the brain drain issue in Ecuador. It explores an original scholarship program implemented in 2007 to counteract the brain drain, an alternative to the traditional country-of-origin principle. This study aims to understand the program's success in increasing the return rate and analyse how its conditions contribute to addressing the brain drain issue. Additionally, the paper proposes an ample research agenda as an extension of the Baruch “push-pull” model, which will be further developed in the third essay.

The third essay, “*Push-pull Factors Influencing the Decision to Stay Abroad after Studies: The Role of the Ecuadorian Scholarship*”, investigates the factors influencing students’ decisions to return to their home country or remain abroad after their studies. It builds upon existing literature but also introduces a new hypothesis that suggests that a return-contingent device, such as the one provided by the Ecuadorian Government, can be a push factor. An empirical analysis based on a survey of Ecuadorian students assesses the effect of the scholarship on the decision to stay abroad. The analysis also addressed the endogeneity issue caused by self-selection, as students may anticipate the possibility of staying abroad when applying for the scholarship.

³ CAIRN, *Journal of International Mobility*, vol. 5, issue 1, 43-74.

⁴ ATINER, *Journal of Business and Economics*, vol. 8, issue 3, 261-276.

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1. Student mobility at a glance: Efficiency and equality in the face of brain drain and brain gain

with Marcel Gérard

Abstract

Cross-border student mobility is a key instrument in fostering peace between European countries, enabling students to discover that they share a common culture, common values, and that they have much to gain by building a cooperative future together, despite a history of war and conflict. For this reason at least, cross-border student mobility is politically desirable, acting as a driver for the future circulation of ideas, innovation, and graduates. It is a way of creating a single market for highly skilled individuals and aligning the mobility of labor with that of productive activities. This may mean brain drain within Europe, at least for a time, but also brain gain for Europe as a whole. Therefore, there is room for a two-dimensional economic reading of student mobility, involving looking at the efficiency of the organization of the higher education system, and equality between individuals and between countries. In this paper, we examine student mobility with regard to both economic efficiency and equality. To do so, rather than limiting ourselves to theoretical considerations, we look at statistics and institutions, develop an assessment of the current student mobility situation, and make some recommendations for higher education policy.

Introduction

Cross-border student mobility is a key instrument in fostering peace between European countries, enabling students to discover that they share a common culture, common values, and that they have much to gain by building a cooperative future together, despite a history of war and conflict. For this reason at least, cross-border student mobility is politically desirable.

Student mobility is also a driver for the future circulation of ideas, innovation, and graduates. It is a way of creating a single market for highly skilled individuals and aligning the mobility of labor with that of productive activities. This may mean brain drain within Europe, at least for a time, but also brain gain for Europe as a whole.

Therefore, there is room for a two-dimensional economic reading of student mobility, involving at the efficiency of the organization of the higher education system, and equality between individuals and between countries.⁵

In this paper, we examine student mobility with regard to both economic efficiency and equality. To do so, rather than limiting ourselves to theoretical considerations, we look at statistics and institutions, develop an assessment of the current student mobility situation, and make some recommendations for higher education policy.

The paper is organized as follows. Section 1 presents the relevant student mobility statistics and details the instruments that facilitate it. We show that student mobility, especially in the EU, is increasing, but in an unbalanced way. Moreover, within the EU it is constrained by EU law, especially by the non-discrimination principle. This leads us to refer to the concept of the “home fee student” (Murphy 2014), used to designate both students from the country in question and students from another EU member state.

In section 2, we assess the efficiency and the equality of the European higher education system, using a quantitative analysis based on an econometric treatment of individual data and on theoretical modeling. Then in section 3 we propose a research agenda, involving in particular an expansion of the model we devised in section 2. In the conclusion, we summarize our findings and make some policy recommendations.

1. Statistics and instruments

Already in existence at the time of Erasmus, cross-border student mobility cannot be said to be an entirely new phenomenon. However, it is currently increasing rapidly, at both a global and a European level. In this section, we present the relevant student mobility statistics and detail the instruments that facilitate it. Our main conclusion is that cross-border student mobility is increasing, but in an unbalanced way. This unbalanced situation could be interpreted in different ways. On the one hand, it could be considered as a sign of brain drain and the inefficient consequence of a war for talent. On the other hand, it could be seen as the result of certain countries specializing in higher education and research, giving them a comparative advantage in such activities. This is where efficiency gain and brain gain come into play. Both interpretations raise important issues.

⁵ All of this can be viewed in the broader context of general EU policy, depicted in the Sapir (2003) report and a 2010 report by the European Commission (2010a).

Before examining the statistics relating student mobility, it is important to clarify who exactly the mobile student being discussed in this paper is. We invite the reader to consult Box 1.1, below.

Box 1.1 – Who is a mobile student?

For Chevalier and Gérard (2009), inspired by Kelo, Teichler, and Wächter (2006), define an internationally mobile student-“mobile student” for short-as a student who crosses a national border for the purposes of studying or carrying out related activities abroad, in the framework of at least of a program of studies or a period of time. To be classed as a mobile student, one must therefore cross an international border. From a statistical point of view, three criteria enable us to measure or identify mobile students: nationality, residence and place of previous studies. Taken separately, none of those criteria is sufficient, but the third one is the most useful as it illustrates the key feature we expect from mobility: a change of environment.

Based on the premise that the available data in international mobility are not always the data we need, Kelo, Teichler, and Wächter (2006) propose an analysis of the strengths and the weaknesses of the current data collections. They explain that because only few countries collect data on proper mobility, this limits the ability to measure its progress. On top of this, for many European countries no level-of-study data are available. This prevents a distinction being made between bachelor’s and master’s degrees, for example.⁶

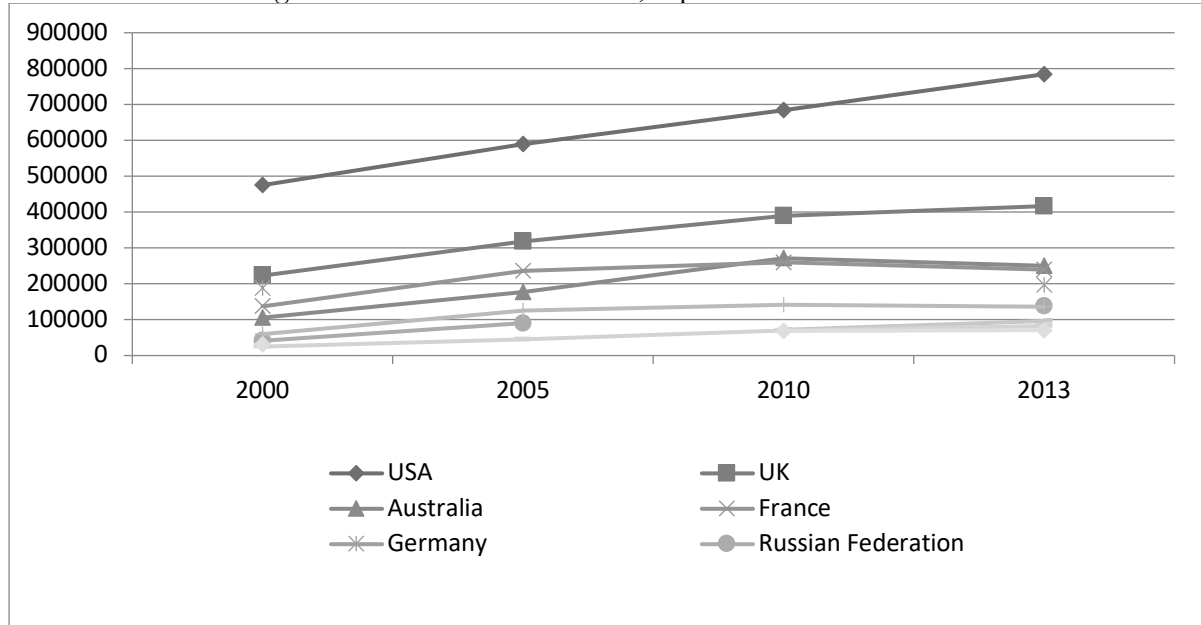
1.1. Statistics, the floor is yours⁷

As illustrated by Figures 1.1 and 1.2, cross-border student mobility has risen sharply since the beginning of the century, although the 2007 crisis seems to have mitigated the phenomenon in some countries. Most remarkable is the increase in the number of foreign students in the US—from less than 500,000 in 2000 to 800,000 in 2013—and in the number of students sent abroad by China during the same period—from a little over 100,000 to 700,000.

⁶ As pointed out by Teichler (2015; 2017) the lack of available data on mobility is particularly problematic for academic staff and researchers. He comments that most countries’ data refer to foreigners “without any specification of whether border-crossing for the purpose of undertaking academic activities in another country has happened” (2015, 31).

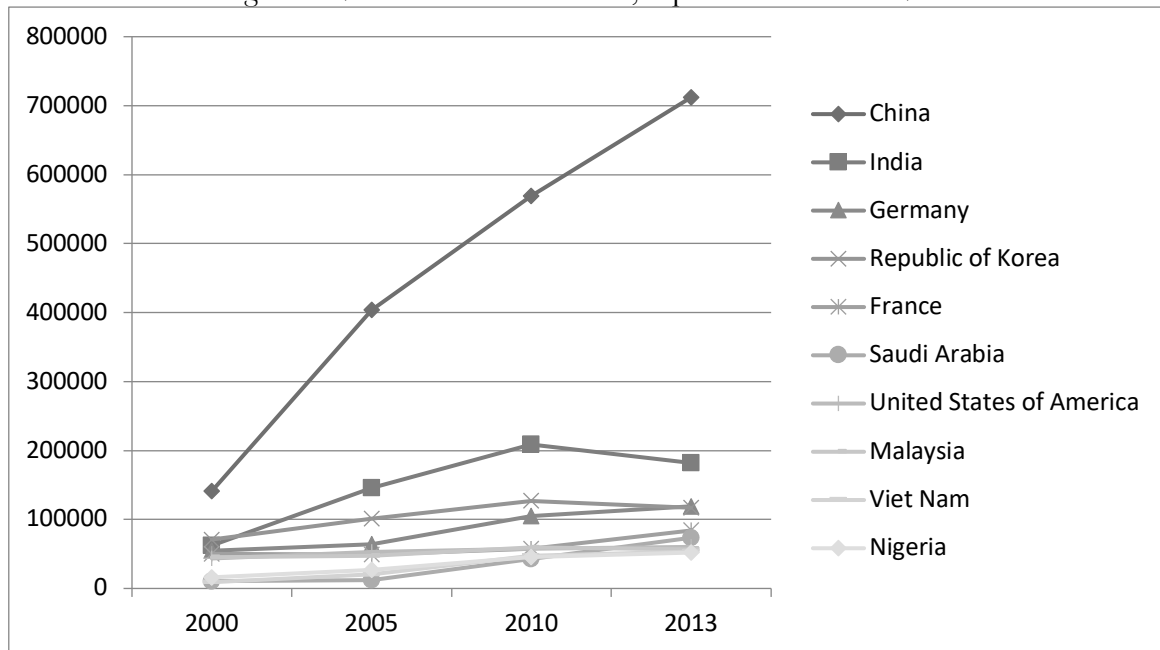
⁷ Main source for the figures in this section is <http://data.uis.unesco.org>

Figure 1.1. - Inbound students, top 10 countries in 2013



Source: Unesco and authors' calculations

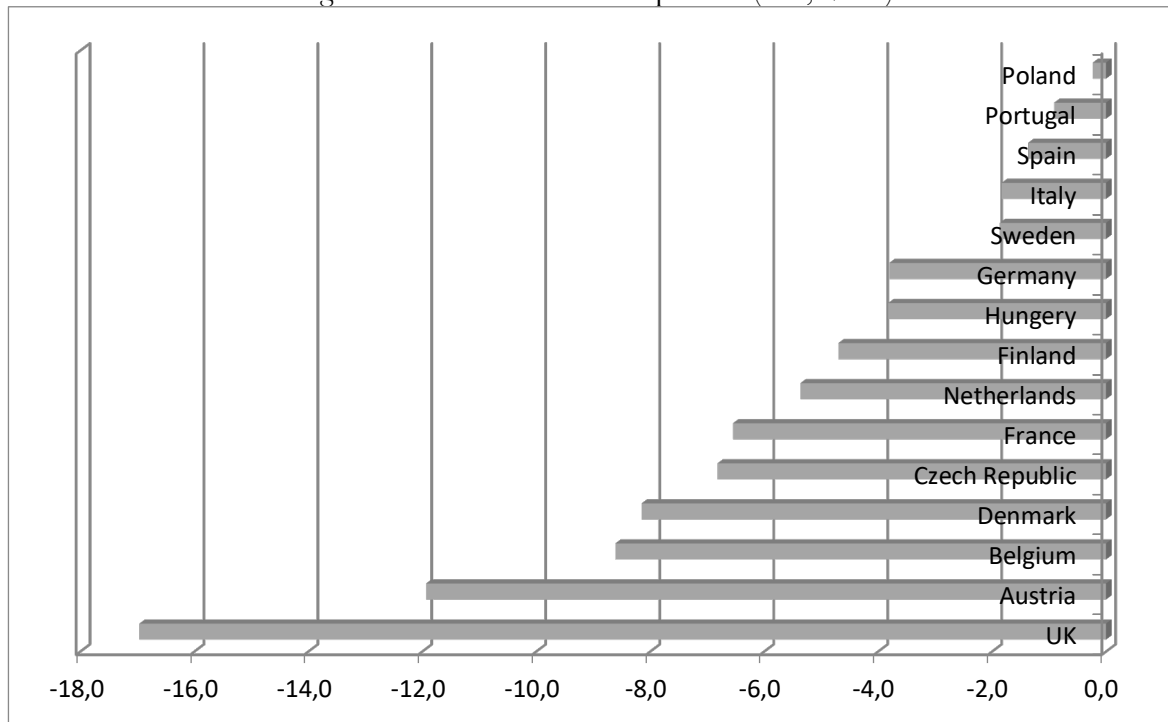
Figure 1.2. - Outbound students, top 10 countries in 2013



Source: Unesco and authors' calculations

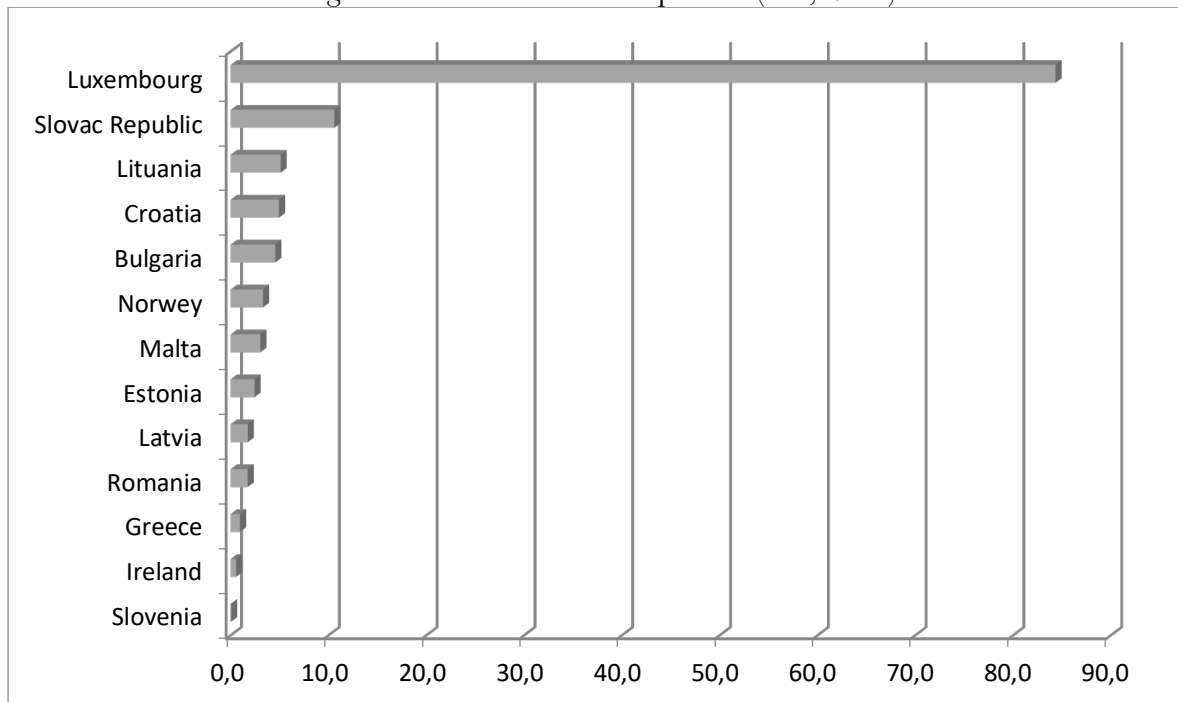
However, these movements of students are clearly unbalanced. Unesco statistics enable us to calculate the difference between the relative number of incoming and outgoing students for each country. These calculations are presented Table A1 of the Appendix, with the statistics for the EU member states presented in Figures 1.3 and 1.4. A negative number means that the country is a net importer of students. To those students it usually offers an advanced education.

Figure 1.3. – Net student importers (EU, 2015)



Source: Unesco and authors' calculation

Figure 1.4. – Net student exporters (EU, 2015)



Source: Unesco and authors' calculation

Three points need to be clarified. First, we write “offers” because we don’t know *a priori* if the host country *gives* or *sells* that education, and if the country of origin *receives* or *buys* it. This depends on

domestic legislation and the agreement between the two countries, as well as on a series of other parameters.

For instance, in the UK, especially in England, “overseas students” (mobile students who come from outside the EU and who are therefore not classed as “home fee students”) are charged high tuition fees. This makes them an important source of financing for universities—8.6 % of the total income of the sector according to Murphy (2014). Higher education is *sold* to these overseas students by UK universities, whose financing policy is based on the “origin principle” (the country of origin or the student’s family back home supports the cost of studying abroad, see section 2). Conversely, in continental Western European countries, tuition fees are low (as compared to the actual cost of studies) and the cost of studies is financed by domestic taxes. This means that higher education is *given*—or more elegantly, *supplied for free*—by these host countries, at least to European residents. Here, therefore, we can speak of a “host principle.”

Second, these statistics do not provide any information about what international students go on to do after they graduate. Do they stay in the country in which they completed their higher education? If so, this is a “brain drain” for their country of origin. Or do they return to their country of origin, where they improve the productivity of their compatriots? This is referred to as a “brain gain” for the sending country (Gagliardi 2014). In other words, a net importer of students may be a net exporter of graduates (although this is not always the case).

Regarding the decision students make about whether to stay in the host country or to return home, Felbermayr and Reczkowski (2014) provide interesting results, confirmed by Van Bouwel and Veugelers (2014). According to the former, the average retention rate—i.e., the proportion of incoming students who stay in the host country after graduation—is about 70 percent for their sample of countries. However, this figure is based on English-speaking countries, primarily New Zealand, Australia, and the US, while it rarely exceeds 5 percent in continental Europe, excluding the Netherlands. In the UK, the figure stands at 35 percent.

Van Bouwel and Veugelers (2014) study the migration pattern of young Europeans who have received a PhD from a US university. Around 70 percent stay in the US for their first job and that stay rate is a good predictor of the location of those researchers ten years later.⁸

Finally, an examination of the statistics reported so far also suggests the existence of a two-level architecture, with a global level and a European level. The former consists of countries like Australia, New Zealand, the US, the UK, France, Germany, and some others. The latter includes the countries surrounding France and Germany. This architecture forces us to make a distinction between the EU and the rest of the world, which is a repeat of that we made between overseas students and home fee students above. This distinction also affects the profiles of the countries.

To take a well-known example, the main reason why Austria and Belgium are the second and third largest net importers of students in Europe is due to their specific attraction for German and French students who have failed entrance examinations for medical or paramedical courses in their own country. In Figure 1.3, we can see that absolute values for the countries surrounding Germany (viz France) are larger than for Germany (viz France) itself. This illustrates the inefficient freeriding by those large countries on their neighbors, who are renowned for their excellent universities, and who offer courses taught in German, English, or French, as well as lower tuition fees and no entrance examinations for medical or paramedical courses (an issue we will return to later on in this article).

⁸ Related literature includes Di Pietro (2012), Dreher and Poutvaara (2011), King and Ruiz-Gelices (2003), Oosterbeek and Webbink (2011), Parey and Waldinger (2011), and Voin and Gérard (2013).

1.2. European instruments for boosting student mobility

At EU level, student mobility is a desirable feature. Two instruments are fundamentally in charge fostering this mobility: the Erasmus Programme and the Bologna Process (although the latter originally an EU initiative). Both must respect EU law when applicable.

1.2.1. The Erasmus Programme

Over the twenty-five year period between 1987 and 2012, the Erasmus Programme enabled more than 2.3 million students to spend at least one semester studying at the tertiary level in a country different from the one where they would receive their degree. It is an exchange program, and students can receive an EU-funded grant to cover the costs of living abroad.

As far as student mobility in general is concerned, the Erasmus Programme is unbalanced. For example, in the 2010–2011 academic year, Spain—the top receiving and sending country, see Box 1.2 for more information—sent about 31,500 students abroad, i.e., 2 percent of its student population, and received nearly 30,600 foreign students. In contrast, the UK sent only 8,600 students abroad, i.e., about 0.5 percent of its student population, but received 17,500 students as part of the Erasmus Programme, and clearly many more than this when overseas students are also taken into account (Figure 1.3).

Box 1.2. Student mobility, Erasmus, 2013-2014

	Type of student mobility		Total
	<i>Studies</i>	<i>Traineeships</i>	<i>Student mobility</i>
Number of Erasmus students	212 208	60 289	272 497
Average EU monthly grant (Euro)	255	367	274
Average duration (months)	6.2	4.4	5.8
Number of grants for special need students	331	70	401
Top sending countries (absolute numbers)	ES, DE, FR, IT, TR	FR, ES, DE, UK, IT	ES, FR, DE, IT, UK
Top sending countries (% share of the student population)	LU, LI, ES, LT, CZ	LV, LT, MT, LI, SI	LU, LI, LV, LT, ES
Top receiving countries	ES, FR, DE, UK, IT	UK, ES, DE, FR, IT	ES, DE, FR, UK, IT
Level of studies (% share)	Bachelor 70% Master 28% Doctorate 1% Short-Cycle 1%	Bachelor 56% Master 31% Doctorate 3% Short-Cycle 11%	Bachelor 67% Master 29% Doctorate 1% Short-Cycle 3%
Average age of students (years)	23.4	23.9	23.5
Number of higher education institution sending students	2 407	2 829	3 456
Gender balance (% women)	60.2%	61.6%	60.5%

Source: Erasmus: Fact, Figures & Trends, European Commission, 2015.

There are at least two reasons for this discrepancy: UK students are probably much less motivated to go abroad since they speak the world's *lingua franca* and have some of the best universities on their

doorstep. Moreover, UK universities, especially those in England, have no interest in welcoming European students for free when they can easily attract overseas students and charge them high tuition fees. Murphy (2014) points out that “the total number of overseas students in UK universities has increased by 91 percent from 2000/2001 to 2008/2009 and by 170 percent since 1994/1995.”

To round off this subsection on the Erasmus Programme, we would like to draw the reader’s attention to Table 1.1 below, and its companion, Table A2, in the Appendix. Notice in particular the differences between Figure 1.3 and Table 1.1 for (e.g.) Austria, which is a net importer of students according to Figure 1.3 (the reason for which we have discussed above), but is almost balanced when the scope is limited to Erasmus students. This illustrates the difference between Erasmus students and Bologna students, to whom we will now turn.

Table 1.1. Erasmus students, inflows, outflows and net rates, 2011-2012

	IN	OUT	RATE ⁹		IN	OUT	RATE
BELGIUM	8593	7091	-0,10	NETHERLANDS	9892	9310	-0,03
BULGARIA	908	1852	0,34	AUSTRIA	5751	5590	-0,01
CZECH REP.	5834	7004	0,09	POLAND	8972	15315	0,26
DENMARK	6501	3315	-0,32	PORTUGAL	9197	6484	-0,17
GERMANY	27872	33363	0,09	ROMANIA	1732	4578	0,45
ESTONIA	1084	1092	0,00	SLOVENIA	1696	1735	0,01
GREECE	2760	3591	0,13	SLOVAKIA	1355	2685	0,33
SPAIN	39300	39545	0,00	FINLAND	6906	5272	-0,13
FRANCE	28964	33269	0,07	SWEDEN	10354	3573	-0,49
IRELAND	5751	2754	-0,35	UK	25760	13662	-0,31
ITALIA	20204	23377	0,07	ICELAND	571	261	-0,37
CYPRUS	693	257	-0,46	LIECHTENSTEIN	61	38	-0,23
LATVIA	892	2194	0,42	NORWAY	4347	1690	-0,44
LITHUANIA	1877	3548	0,31	TURKEY	5269	11826	0,38
LUXEMBOURG	498	450	-0,05	CROATIA	377	882	0,40
HUNGARY	3757	4361	0,07	SWITZERLAND	3897	2714	-0,18

Source: European Commission and authors’ calculations.

1.2.2. Bologna students

Under the Bologna framework, students are not exchange students like in the Erasmus Programme. Instead, they enroll in the host institution abroad, where they attend classes for a term, a year, or more. They pay the tuition fee for that institution, and are permitted to have the credits they obtain abroad recognized as part of the program that they follow in their original country of study, via the ECTS (European Credit Transfer and Accumulation System).

The Bologna Process was not an EU initiative when it launched in 1999. Its goal was to build up a European educational space by 2010, and its philosophy is well defined in the Bologna Declaration which calls for a “Europe of Knowledge” and recognizes “the importance of education and educational co-operation in the development and strengthening of stable, peaceful and democratic societies”

⁹ The net rate is calculated using the equation $([\text{Outbound}-\text{Inbound}]/[\text{Outbound}+\text{Inbound}])$, with a negative figure meaning that the country is a net importer of students, in this case of Erasmus exchange students.

(Bologna Declaration 1999). The declaration's goals have been turned into courses of action, work plans, and objectives, as well as into legislative acts.

1.2.3. The EU principles of non-discrimination and subsidiarity

To understand student mobility in the EU, one needs to keep in mind that two principles at the root of EU construction are at work. First, EU principles forbid a member state to discriminate against citizens of another member state. This means that a Spanish university must charge non-Spanish EU residents the same fee and impose the same rules as it does for Spanish residents.¹⁰ In contrast, although a Scottish university must accept Belgian applicants under the same conditions as it would Scottish ones, including charging them the same tuition fees, this Scottish university may discriminate against English students because they come from the same EU member state, namely the UK.¹¹

On the other hand, the principle of subsidiarity (Pelkmans 2006) allows a competence to be transferred from member states to the EU if and only if that competence might be better performed at that upper level. Education raises questions in this respect. If the education system is considered as a whole, from nursing schools to universities, there are arguments for keeping education a national competence (as in France), or a sub-national competence (as in Belgium, Germany, or the UK).

For tertiary education, the case is less clear and portraying a decentralized system that exhibits the same properties as a centralized efficient one is a challenge for economists and designers of higher education systems.

2. An assessment of cross-border higher education

Our assessment focuses on three areas. First, we draw on empirical results: observation and econometric investigation show a link between student mobility and graduate mobility, demonstrating that it pays to incentivize student mobility. Second, we discuss the financing of studies abroad and the associated costs of living. We highlight the inefficiency of the financing rules, before going on to make three recommendations. Lastly, we make some qualifications, emphasizing that although the Erasmus system is efficient in promoting a European network of mobile graduates and leaders, it can also be viewed as counter-distributive.

2.1. What empirical studies show us¹²

When it comes to investigating the probability of having an international career after studying abroad, two particular papers receive the most mentions. These papers have contributed to the widespread belief that student mobility influences international labor market mobility. First is the study by Osterbeek and Webbink (2011). Using data on Dutch students who were awarded scholarships by the government to study abroad, they found that studying abroad lowers the probability that those students will live in the Netherlands in the first years of their career by 30 percent. Moreover, every extra month spent studying abroad decreases students' propensity to settle down in the Netherlands by 4 to 5 percentage points.

¹⁰ See European Court of Justice (2010), for a typical case.

¹¹ Once the UK has left the EU, it is possible that students from EU member states—previously classed as home fee students—may be classed as overseas students and therefore charged higher tuition fees.

¹² This section is based on Voin and Gérard (2013a)

The other paper, by Parey and Waldinger (2010), also suggests that studying abroad has an influence on the future professional mobility of graduates. Looking at Erasmus exchanges undertaken by students from German universities, they found that studying abroad increases the probability of working abroad by 15 percentage points. Moreover, students enrolled in Erasmus Programmes have a “probability of studying abroad [that] increases by about 2.5 percentage points if [their] department participates in the Erasmus Programme” (ibid., 17).

However, both studies only used data from one country. Von Gordon (2011), meanwhile, carried out a European-wide survey. Her findings were similar: studying abroad at all levels is positively correlated with future labor market mobility.

Voin and Gérard (2013a; 2013b) used data from questionnaires submitted to Belgian universities. Most respondents were graduates in economics or in business from the Université catholique de Louvain (66 percent) and the Université libre de Bruxelles (16 percent). This dataset allowed the authors to investigate, using econometric methods and individual data, the factors motivating studies abroad and those motivating graduates to leave their country of origin to work abroad. This dataset is interesting because it includes both graduates with and without an experience abroad before or during their tertiary education.

Focusing on the factors driving graduates to leave their home country to work abroad, Voin and Gérard (2013a) show that studying abroad during higher education increases the probability of working abroad after graduation by 11–12 percent. Participation in the Erasmus Programme yields a similar additional probability. This result is close to that of Parey and Waldinger (2010). Additionally, graduates are also more likely to leave their home country to work abroad if they have had some experience abroad between their secondary and tertiary education, and if they studied economics or management science, i.e., if they hold a degree in a field that would easily enable them to take a job in another country. More generally, that mobility increases with skill is a well-established result confirmed by Sjaastad (1962) and Greenwood (1973). On this, see also Borjas (1987; 1990; 1991), and Übelmesser (2006).

As an example, let us look at the figures for Canada, collected in the 2001 and 2006 censuses.¹³ If we consider the Canadian population as a whole, 2.7 percent of people who lived in one province in 2001 were living in a different province in 2006. But for those with a bachelor’s or master’s degree, this figure rises to 4.4 percent, while the figure for PhD holders is slightly higher still. If we include people who did not live in Canada in 2001 but migrated there between 2001 and 2006, the figures are 6.4 percent for the entire population, 12.4 percent for holders of a bachelor’s degree, 17.4 percent for holders of a master’s degree, and 18.2 percent for PhD holders.

2.2. Financing and spillover effects matter¹⁴

The many statistics we have detailed so far show that where students study and potentially go on to work has become increasingly less limited by the borders of their country of origin, at least for tertiary education students. Of course, this is not yet the case for all students—irrespective of their country, discipline, and level of studies—, or even for most of them. Nevertheless, it is a significant change, permitting us to speak of a paradigm shift. It should alert policy makers and researchers to the fact that those who are the richest in talent—i.e., the richest in human or financial capital—can now take the

¹³ The Canadian data were made available to us by François Vaillancourt and Véronique Laramée from the University of Montreal. Canadian data are useful because of their homogeneity: we have comparable figures for a series of jurisdictions of the same union or federation.

¹⁴ This section is based on Marcel Gérard’s contribution to a blog on the economics of higher education. For the model behind it, see Gérard (2007) and Gérard and Übelmesser (2014).

best that any country has to offer and then enjoy that of any other, simply by virtue of the power of mobility.

In other words, until recently, students would receive an education, work, retire, and die in their country of birth. For that country, financing these students' education was an investment that improved the social welfare of the local population: their larger graduate income meant extra tax revenue, better health (Webbink, Martin, and Visscher 2010), and improved productivity of both high- and low- skilled people. These positive externalities for the local population justified and even guided an efficient and fair sharing of the cost of studies between public subsidies financed by tax and private tuition fees paid by families, foundations, or financial institutions providing loans. This was the old paradigm.

Nowadays the story, or more precisely the model, is has changed¹⁵. More and more students and graduates are international: the country that hosts them for higher education might be not their place of birth and initial education, nor is it likely to be that of their career after graduation. And the jurisdiction that finances their studies is no longer necessarily that which will benefit from their increased human capital. Studying abroad is increasingly becoming a driver for subsequently working abroad. We are therefore faced with cross-border spillover effects or externalities.

Such a new context, even if it is still only applies to a minority of people, raises important issues, particularly when it comes to higher education policy: Why should a government keep financing higher education with public money if individuals decide to go and work abroad as soon as they graduate? Going abroad might be attractive for several reasons: lower taxes on higher income, but also agglomeration effects like Silicon Valley¹⁶ and the City of London. It turns out that the paradigm shift raises questions about how the entire higher education and research sector is funded.¹⁷

Table 2.1 aims to highlight the issue of this new paradigm. We assume that students have three countries: their country of origin, the country that hosts them for their higher education, and the country in which they will work after graduation. For a given student, two or three of the countries may be the same. Each cell details the costs incurred and the benefits enjoyed by the country at stake, while each row depicts an institutional arrangement as to the financing of higher education.

Table 2.1. – Alternative devices for financing higher education

	<i>Who supports the costs and enjoy the benefits of higher education?</i>		
<i>Who finances the cost of studies?</i>	Host country	Origin country	Destination country
Host Principle	Cost of studies	Cost of living Opportunity cost	All benefits
Origin Principle		Cost of studies Cost of living Opportunity cost	All benefits
Destination Principle		Cost of living Opportunity cost	Cost of studies All benefits

Source: Gérard (2012)

Notice that we assume that the country of origin covers the costs of living abroad (paid for by the student's family or a fund), as well as the opportunity cost. That latter measures the sacrifice in current GDP implied by years of studies.¹⁸

¹⁵ A model is a simplified story that can help us to understand and analyze a problem.

¹⁶ See for example Hsu and Saxenian (2001).

¹⁷ See Wildasin (2014) for a general view of the impact of mobility on the financing of public goods and services. For Education specifically, see Haussen and Uebelmesser (2015), Justman and Thisse (1997; 2000).

¹⁸ The measure of the opportunity cost might be approximated by the wage paid to unskilled people.

Moreover, in our table we only consider the benefits *after* graduation. These therefore go entirely to the destination country and to the graduate expected to live there. However, this view does not take into account all the benefits enjoyed by a country that welcomes foreign students and sends resident students abroad, or those enjoyed by students who have an experience abroad—see Box 2.1 below, and Barr (2014).

Box 2.1 – More on the benefits of student mobility¹⁹

A) The benefits for the sending and the receiving countries include

- it increases competition between universities through pressure for:
 - transferable credits
 - better and more foreign language courses
 - better and more courses taught *in* foreign languages
 - improved quality in general, due to increased demand for this from students;
- it improves labor mobility;
- it fosters research and innovation;
- it reduces brain drain, since spending time in a foreign institution and coming back home can be an alternative to emigration;
- it gives students the possibility to choose the country and institution that best matches their preferences; and
- as argued by Beine, Docquier, and Rapoport (2008) and Haupt, Krieger, and Lange (2014), going abroad to study might have a positive effect on developing countries through returnees' improved human capital—even if they are few in number—and by non-returnees' repatriation of funds, which are used to provide their family with better opportunities to study.

B) The benefits for students include

- they develop the skills required to adapt to a different culture, for example flexibility, adaptability, problem-solving, critical thinking, and a deeper understanding of cultural differences when tackling problems;
- they create positive spillover effects;
- they learn (how) to cooperate with others;
- they gain new knowledge and have new experiences;
- they receive better pay;
- they have a reduced chance of being unemployed; and
- they enjoy a higher social status at home or abroad.

There are three different scenarios for financing the actual cost of studies. First, under the “host principle,” students who go abroad to study have the cost of their studies primarily financed by the country in which they study, the host country. This is the most popular system in continental Western Europe.²⁰ When applied, this mechanism is justified by the willingness to have university studies financed by taxes, and for university to be accessible to poor as well as rich students, as well as by EU law prohibiting discrimination between EU citizens. The paradox is that those countries whose best interest is to have the studies of foreigners paid for by their own country of origin, and most often of

¹⁹ There is already a huge amount of literature on this subject, see for example Mechtenberg and Strausz (2008)

²⁰ Except possibly for a tuition fee whose amount is relatively small compared to the actual cost of studies.

destination, keep operating under the host principle, which is inefficient in terms of public finance and international students.

Second, under the “origin principle,” studies abroad are financed by students’ country of origin, through public money, private funds, or both. This is what happens in English-speaking countries, but also in the Nordic countries and Switzerland.

In English-speaking countries, students are funded primarily by their families, or by a fund from their country of origin. In the Nordic countries and Switzerland, funding comes from the government in the country of origin. Compared to the host country principle, this system improves social welfare when students typically return to their country of origin after graduation. Paradoxically, it is also at work in the English-speaking world, in countries like the UK and the US, which have a high capacity to retain talented foreign students. These countries then freeride on the rest of the world.

Finally, under the “destination principle,” the cost of higher education is covered *ex post* by the country in which students end up after graduation. In fact, it is refunded to the country of origin or to the host country through, for example, a Bhagwati tax or the interest on a contingent loan.²¹ We can show that, under the assumptions of the model behind this narrative, this type of mechanism is the most able to internalize externalities and thus to replicate in a decentralized world the efficient outcome of a centralized setting.

A conclusion emerges: the paradigm shift has created a mismatch between the population who pays for higher education and the population who benefits from higher education. And behind this phenomenon we can see the risk of public authorities partially giving up financing higher education, with the private sector doing so instead—see Poutvaara (2004), Haussen and Übelmesser (2015), Justman and Thisse (1997; 2000). Such a shift can be justified by the fact that it is graduates who are the primary beneficiaries of their studies—in terms of income, health, and quality of living. But this raises serious issues in terms of both efficiency and equality.

Therefore, we need to improve the efficiency of the market for international students. Our three tentative policy recommendations for doing so are:

1. In the spirit of inter-canton arrangements in Switzerland, make every developed country responsible for the financing of the higher education of its residents with relevant capabilities²², either at home or abroad. This should be done by providing students with (possibly income-contingent) loans, grants, or by a state-to-state transfer, in all cases in the form of vouchers that can be used to finance students’ higher education in institutions whose quality is recognized by the country of origin.
2. Make higher education free for students during their time of studies (Barr 2014).
3. Make it so that destination countries no longer freeride off other countries. Instead, they should compensate the countries that have pre-financed the studies, by repaying the relevant proportion of the loans, grants, or state-to-state transfers mentioned in recommendation one.

²¹ On income-contingent loans, see Del Rey and Racionero (2014). On the Bhagwati tax, see Bhagwati (1976) and Wilson (2008).

²² We call capabilities the competences that an individual is able to acquire if she benefits of the most favorable environment, given her talents; that proceeds from the idea that, though everyone has talents, those talents can only be turned into competences if the person benefits of a favorable environment.

2.3. A class issue? Profile and equality

We cannot escape the question of who the mobile students in Europe actually are. First of all, they are students, i.e., people who have access to higher education; and we know their profile.

But let us now revisit Voin and Gérard (2013a; 2013b). Their examination of what drives students to study abroad shows that the level of education of the parents is always significantly different from zero, especially that of the mother. It turns out that students whose fathers have a PhD or an MD, or whose mothers have a bachelor's or master's degree, are 20–23 percent more likely to study abroad. Students whose mothers have a PhD or an MD are 36–48 percent more likely to study abroad and to become “international.”

Experience abroad prior to entering university—either as such or specifically dedicated to a humanitarian job, learning a foreign language, or repeating the last year of secondary education abroad—is also a significant driver of studying abroad. These students are already “internationally minded” when entering university and thus more likely to study abroad. All in all, an experience abroad between high school and higher education increases the probability of studying abroad during higher education by 19–20 percent. This probability rises to 24.7 percent for those who have repeated their last year of high school abroad, and to 49.7 percent for those who have spent time abroad learning a foreign language. The fact that such stints abroad are more popular among high-income families reinforces the idea that studying abroad is stimulated by the standard of living of the parents.

Therefore, presumably, there is a positive link between the social status captured by the highest degree obtained – that of “international graduate” – and the social status of the parents, and thus their level of income. That link deserves attention: if the cost of studies has been socialized, at least in continental Western Europe, but for a tuition fee relatively low compared to actual cost, the cost of living abroad or of participating experiences which are known to make you an international person rests on the family and private support – like service clubs or foundations.

Our observation echoes the issue raised by Ballatore and Ferede (2013). For them, if Erasmus claims to be the world's most successful student exchange scheme, the pertinent question is successful for whom? The empirical research that they have conducted on Erasmus participants and non-participants in France, Italy and the UK finds that participation differs by social class. Compared with sedentary students, Erasmus students engaged in more academic and leisurely travel and have higher socio-economic status. They argue that in the age of increased education access, an Erasmus year may be used to signal distinction and privilege. Participants are also more open to international opportunities, increasing their employment chances and further reinforcing their advantages.

Thus signaling distinction and privilege is facilitated by a background of distinction and privilege.

This means that there is a risk that Erasmus subsidies, although certainly justified on economic efficiency grounds (see above) might be counter-distributive in terms of income: they contribute to creating a network of young leaders at European level by interconnecting the domestic networks of each country's bourgeoisie. This is not a reason to condemn or to stop the Erasmus Programme, but to face up to a new challenge: that of making “internationality” accessible to every young European with the relevant capabilities, regardless of his or her family's social status.

In this respect, the development of contingent loans is a potential avenue.

3. A research agenda

An assessment quite naturally generates an agenda for action, which we will now outline.

The first action is to better integrate the day-to-day expenditure of incoming foreign students in the host country, taking into account that outgoing students no longer contribute to domestic expenditure in their local housing, food, and entertainment markets.

Behind the scenes, in section 2.2, we implicitly assumed a model where governments act in the best interest of their citizens, and as such decide on the number of students they host or send. In both cases, their choice departs from the efficient one due to the absence of consideration for returning graduates under the host principle, or for graduates remaining abroad under the origin principle. This model is certainly worth considering, but it would benefit from some fine tuning.

Here are some other potential avenues to be explored:

A first addition would be to move from a single level of power to a twofold level of authority. In practice, this involves moving from sole domestic governments who are acting in the best interest of their own citizens, to a series of domestic governments playing horizontally but related vertically to an intergovernmental jurisdiction in charge of internalizing externalities, for example through issuing common norms.²³

Another issue falls under the scope of an augmented version of the model: English-speaking countries charge foreign students the highest tuition fees, which are often paid, at least for the first year, with a fellowship granted by the country of origin. However, English-speaking countries also have the highest retention rates. So why do countries send their resident students to the US? A possible answer is that a stay in the US generates such a high return in terms of brain gain, productivity, or networking that even if only few students return home after their graduation, there is a social welfare gain for their country of origin.²⁴

The puzzle of heterogeneity among countries in terms of return rate might be solved by incorporating two additional features into the model. One is to make the decision about whether to stay or to return after graduation an endogenous one. The other is to embody the possible compulsory repayment of the fellowship to the country of origin, especially if this obligation is extended to the family. Such expansion might be nested in the framework of a principal–agent approach.²⁵

The increasingly popular MOOCs (massive open online courses) also merit our attention. They clearly push down the cost of accessing higher education and possibly advanced degrees, and they enlarge the hiring field of best education providers for every student in the world. The same tool might therefore be seen as the largest access to knowledge and as the ultimate strategy in the war for talent.

Finally we must make “internationality” accessible to every young European with the relevant capabilities, regardless of his or her family’s social status.

²³ See for example Gérard (2007), Lange (2009), Kemnitz (2010), Krieger and Lange (2010), Gérard, Gilson, and Ruiz (2012), and Wildasin (2000).

²⁴ Introducing productivity gains, increasing returns to scale or agglomeration effects was suggested to the authors by Caroline Hoxby; see also Haupt, Krieger, and Lange (2014).

²⁵ The Bhagwati tax model is another step forward in this direction (Gérard and Übelmesser 2014).

Conclusions

In this paper, we have examined the cross-border mobility of students from the point of view of economic efficiency and from that of equality. As such, we have not limited our study to theoretical considerations, but have instead looked at both statistics and institutions, developed an assessment, and established a research agenda. In this concluding section, we complete this work by issuing some recommendations for higher education policy.

But first, to recap what we have achieved in this article. In section 1, we focused on statistics and institutions in order to paint a picture of international student mobility. We explained that the phenomenon is growing but unbalanced, and highlighted which countries are net exporters of students and which countries are net importers. In addition, we pointed out the reasons for the heterogeneity among countries, contrasting exchange and enrolled students (Erasmus versus Bologna), English-speaking countries versus continental Western European ones, and in that latter group large countries like France and Germany versus fellow small neighbors like Austria or Belgium. We also shed light on the importance of EU principles in understanding how the European higher education system operates.

Section 2 then offered an assessment of the current international system of higher education and its expected future trends. This assessment was developed based on three areas. The first one focused on empirical results: observation and econometric investigation show a link between student mobility and graduate mobility. Therefore, incentivizing student mobility makes sense. The second focused on the costs of studies and their financing: the cost of studies *sensu stricto*, but also the cost of living abroad and the opportunity cost. This axis highlights the inefficiency of the financing rules and resulted in us making three recommendations. Finally, we introduced some qualifications to our discussion, recognizing that although the Erasmus system is efficient in promoting a European network of mobile graduates and leaders, it can also be viewed as counter-distributive.

Section 3 detailed our research agenda, which we shall not recap here seeing as we have only just dealt with it above.

To finish, we have developed four recommendations arising from this work and that seem to us particularly relevant for the elaboration of higher education policy, especially for the design of an international system that is efficient and promotes equality:

- make every developed country responsible for financing the higher education of its residents who have the relevant capabilities;
- make higher education, including “internationality,” accessible to every young European with the relevant capabilities, regardless of his or her family’s social status;
- make higher education free for these students during the time of their studies; and
- ensure that destination countries no longer freeride off other countries.

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Appendix

Table A1 – Unbalanced flows of cross-border students*

Countries	2015	1	2	3	Countries	2015	1	2	3
Albania	13,3				Lesotho	11,7			
Algeria	1,0				Liechtenstein	42,5			
Andorra	225,3				Lithuania	5,1		x	
Australia	-17,5	x			Luxembourg	84,3	x	x	
Austria	-11,9	x	x		Madagascar	2,0			
Azerbaijan	14,9				Malaysia	0,6			
Bahrain	-0,2				Malta	3,0		x	
Belarus	3,9				Mauritania	18,6			
Belgium	-8,6	x	x		Mauritius	13,2			
Bermuda	158,3				Mexico	0,6	x		
Bosnia-Herzegovina	2,7				Mongolia	4,8			
Brazil	0,2			x	Morocco	3,6			
Brunei	25,6				Mozambique	0,9			
Bulgaria	4,5		x		Myanmar	1,1			
Cameroon	7,1				Nepal	7,6			
Cape Verde	23,6				Netherlands	-5,4	x	x	
Chile	0,5	x		x	New Zealand	-16,8	x		
China	1,5				Niger	4,7			
Hong Kong	0,8				Norway	3,3	x	x	
Macao	-31,4				Oman	8,4			
Colombia	1,0			x	Philippines	0,2			
Côte d'Ivoire	2,2				Poland	0,0	x	x	
Croatia	4,9		x		Portugal	-0,9	x	x	
Cuba	-4,1				Qatar	-20,2			
Cyprus	24,7		x		Korea	1,7	x		
Czech Republic	-6,8	x	x		Moldova	15,1			
Denmark	-8,1	x	x		Romania	1,7		x	
Egypt	-1,0				Russia	-2,3			
El Salvador	1,4			x	Rwanda	6,1			
Estonia	2,4	x	x		Saint-Lucia	16,8			
Finland	-4,7	x	x		Saudi Arabia	0,8			
France	-6,5	x	x		Senegal	-7,9			
Georgia	3,1				Serbia	1,5			
Germany	-3,8	x	x		Singapore	-10,9			
Ghana	-1,6				Saint-Martin	8,3			
Greece	0,9	x	x		Slovak Republic	10,6	x	x	
Grenada	-63,2				Slovenia	0,0	x	x	
Guinea	5,0				South Africa	-3,5			
Guyana	16,5				Spain	-1,4	x	x	
Honduras	1,3			x	Sri Lanka	5,1			
Hungary	-3,8	x	x		Swaziland	34,4			
Iceland	8,3	x			Sweden	-1,9	x	x	
India	0,6				Switzerland	-12,9	x		

Indonesia	0,5				Tajikistan	4,9			
Iran	0,7				Thailand	-1,0			
Ireland	0,5	x	x		Former Yugoslavia	3,7			
Israel	0,9	x			Tunisia	3,6			
Italy	-1,8	x	x		Turkey	-0,1	x		
Japan	-2,6	x			Ukraine	-0,7			
Jordan	-6,1				United Arab	-40,6			
Kazakhstan	8,6				UK	-17,0	x	x	
Kyrgyzstan	-1,4				USA	-4,3	x		
Laos	2,4				Uzbekistan	8,9			
Latvia	1,7	x	x		Vietnam	2,4			
Lebanon	-3,3				Zimbabwe	11,8			

*An “x” in column 1 indicates an OECD country; in column 2, an EU member state; in column 3 a Latin American country.

Source: Unesco and authors’ calculations.

Table A2. Erasmus Students, matrix of flows, 2011-2012

		Destination Country																																				
		BE	BG	CZ	DK	DE	EE	GR	ES	FR	IE	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	IS	LI	NO	TR	HR	CH	TOT			
Home Country	BE		14	109	217	497	25	43	1511	1107	158	435	18	12	40	114	106	52	391	154	105	272	49	40	1	274	264	621	8	1	129	135	7	182	7091	BE		
	BG	73	0	102	25	342	6	76	184	169	9	117	3	12	17	3	29	5	58	94	104	63	27	23	39	25	23	105	0	2	7	96	10	4	1852	BG		
	CZ	276	30	0	207	1046	52	164	721	805	102	259	21	36	64	9	44	21	253	352	168	372	8	174	123	381	236	552	29	6	196	181	23	93	7004	CZ		
	DK	72	44	35	0	543	13	32	396	325	52	102	13	38	54	0	23	24	241	86	37	78	38	14	8	27	88	622	29	1	112	94	1	73	3315	DK		
	DE	603	60	448	958	0	168	182	6175	5382	1067	1785	50	136	130	66	528	93	1066	802	829	550	120	100	54	1206	2642	4330	129	11	1083	1392	29	1189	33363	DE		
	EE	23	5	45	36	131	0	14	137	73	3	52	10	22	8	0	28	7	48	32	11	63	0	4	3	150	67	59	7	0	16	28	0	10	1092	EE		
	GR	169	13	182	83	513	10	0	505	537	17	260	87	6	19	5	50	0	178	110	116	144	17	18	14	88	104	190	1	1	31	93	1	29	3591	GR		
	ES	1883	155	948	933	4609	79	342	0	4744	1010	8282	70	132	252	15	374	213	1488	663	2495	2610	304	246	190	922	1095	4170	61	7	545	311	23	374	39545	ES		
	FR	1081	62	678	911	3770	118	338	6791	0	1748	1847	56	73	184	170	482	233	1302	453	743	392	350	133	143	1122	1801	6502	63	0	696	485	51	491	33269	FR		
	IE	109	6	52	56	365	1	5	449	645	0	95	4	0	0	25	22	40	154	50	20	16	2	2	2	37	104	412	5	1	33	11	0	31	2754	IE		
	IT	960	23	207	437	2381	91	136	7652	3403	419	0	36	42	119	17	213	108	766	362	455	1150	188	60	58	487	621	2037	33	0	290	341	10	275	23377	IT		
	CY	16	0	1	4	8	3	44	55	22	2	14	0	0	2	0	4	1	4	3	7	3	2	6	0	7	6	36	1	0	0	6	0	0	257	CY		
	LV	62	48	44	92	227	69	237	217	94	10	83	36	0	152	6	24	4	90	46	114	92	6	23	21	86	100	63	10	7	62	58	5	6	2194	LV		
	LT	125	40	138	197	264	45	119	314	188	24	176	66	85	0	1	70	49	112	69	146	296	22	57	44	202	138	172	10	0	80	260	14	25	3548	LT		
	LU	36	0	8	0	221	0	0	5	104	0	9	0	0	0	0	3	0	4	12	1	8	0	0	0	7	4	6	0	0	0	1	0	21	450	LU		
	HU	243	10	83	60	1007	34	60	382	379	46	352	18	9	26	4	0	10	284	220	167	158	67	46	27	173	82	203	6	4	51	103	10	37	4361	HU		
	MT	7	0	0	3	19	0	0	7	0	7	42	0	0	2	0	5	0	5	0	4	2	0	0	1	0	0	45	0	0	0	0	0	0	149	MT		
	NL	660	29	88	341	1026	33	60	1575	756	188	376	7	16	24	6	147	49	0	225	88	191	24	18	6	333	620	1499	23	2	298	436	3	163	9310	NL		
	AT	115	8	96	207	904	35	22	799	592	176	341	5	6	17	8	46	18	282	0	48	117	10	36	16	265	420	454	31	5	154	120	42	195	5590	AT		
	PL	455	238	516	471	2228	65	373	2721	1253	89	1326	65	82	157	8	249	73	465	313	0	1176	76	165	302	297	340	801	29	5	188	642	68	79	15315	PL		
	PT	273	31	370	104	339	33	37	1602	322	21	855	3	20	105	6	169	17	232	90	756	0	142	143	77	114	117	278	3	2	50	82	11	80	6484	PT		
	RO	159	4	56	88	529	4	134	606	1094	16	460	28	9	20	0	291	11	112	127	131	257	0	10	31	29	22	171	3	2	28	129	4	13	4578	RO		
	SI	49	6	89	36	279	5	23	326	114	15	65	3	4	13	0	13	9	55	108	50	155	1	0	15	51	39	75	6	1	29	46	38	17	1735	SI		
	SK	90	3	499	50	347	12	35	295	226	13	129	4	15	20	2	60	28	70	102	166	119	9	45	0	98	50	84	11	0	45	40	13	5	2685	SK		
	FI	191	6	123	88	886	63	61	743	479	152	142	30	12	20	6	107	29	450	308	54	140	7	48	21	0	202	648	31	3	50	33	8	131	5272	FI		
	SE	106	0	71	98	465	9	25	359	573	96	179	4	2	3	1	29	7	316	144	28	63	4	8	1	36	0	627	12	0	54	61	4	188	3573	SE		
	UK	259	19	172	230	2010	28	53	3225	4282	142	947	50	11	16	24	47	73	582	252	75	126	20	14	9	243	335	0	29	0	118	83	2	186	13662	UK		
	IS	5	1	7	34	29	0	4	31	21	2	22	0	0	1	0	4	3	8	17	1	2	0	2	0	2	44	21	0	0	0	0	0	0	261	IS		
	LI	1	0	1	1	2	0	0	9	2	2	1	0	1	0	0	1	0	2	0	0	0	0	0	0	4	2	4	1	0	2	2	0	0	38	LI		
	NO	50	2	36	182	234	9	8	164	234	32	81	1	2	0	0	21	11	135	47	18	64	0	10	4	16	107	222	0	0	0	0	0	0	1690	NO		
	TR	339	44	576	255	1967	70	124	897	610	62	1095	0	102	402	1	525	7	575	259	1965	433	232	158	136	145	425	422	0	0	0	0	0	0	11826	TR		
	HR	19	4	42	6	97	2	1	84	52	10	117	4	0	5	1	32	3	13	128	51	50	5	91	8	5	22	30	0	0	0	0	0	0	882	HR		
	CH	84	3	12	91	587	2	8	363	377	61	158	1	7	5	0	11	4	151	123	19	35	2	2	1	74	234	299	0	0	0	0	0	0	2714	CH		
	TOT	8593	908	5834	6501	27872	1084	2760	39300	28964	5751	20204	693	892	1877	498	3757	1202	9892	5751	8972	9197	1732	1696	1355	6906	10354	25760	571	61	4347	5269	377	3897	252827	TOT		
	BE	BG	CZ	DK	DE	EE	GR	ES	FR	IE	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	IS	LI	NO	TR	HR	CH					
source: europa.eu/rapid/press-release_IP-13-657_fr.htm																																						

source: europa.eu/rapid/press-release_IP-13-657_fr.htm

Source: Eurostat

2. Fighting Brain Drain: the Ecuadorian scholarship²⁶

Abstract

In 2007, the Republic of Ecuador introduced a new scholarship program for financing Ecuadorian students intending to study abroad. This program still exists and stipulates a compulsory return to the students' home country after completing their studies abroad. Statistical data shows a return rate of about 90%, which is somewhat surprising at first glance. This paper aims to introduce the Ecuadorian scholarship program as a case study in the literature of financing systems of student mobility in higher education, while attempting to give a first analysis of its mechanism design.

²⁶ I want to express my gratitude to my supervisor, Professor Marcel Gérard, for his useful comments and suggestions on this paper.

Introduction

Globalization has several implications for the mobility of students and skilled workers. Over the last decade, the phenomenon of ‘brain drain’, a clear and peculiar consequence of the current globalized world, has gained the attention of many academic researchers. In conjunction with the increasing number of international students, the percentage of students staying in the country where they studied is also increasing. To give an example, Van Bouwel (2010), who analyzed the migration behavior of a sample of European economics students who obtained a PhD in the US, stated that “64% are currently working in the US, whereas only 24% moved back to their home country, and an additional 10% moved to another European country”. Among other factors, as argued by Lange (2010), technological changes could explain the general linear rise in the stay rate since communication has become cheaper and travel costs have also reduced, allowing students and graduates in their host countries to stay in touch with their relatives and friends abroad.

Particularly interesting for people from developing countries, brain drain arises when the general socioeconomic conditions to stay abroad (that is typically the country they chose to study in) are better than those in their home country. This phenomenon is highly disadvantageous to human capital, since the need for highly skilled workers and highly educated citizens is more significant than in developed countries. Geesen (1998) states that brain drain makes developing countries less competitive than developed ones. In the same way, Docquier (2014) argued that among different country-specific factors, the country’s level of development determines whether a country gains or losses in terms of the brain drain effect. But on the other hand, it is highlighted the importance of the general trend and the ‘mimicking effect’ among mobile skilled workers. In particular, “when a return is significant, it gives incentives to other waves of returnees to come home”²⁷.

One of the causes of the brain drain phenomenon could be attributed to a lack of efficiency in the financing systems of student mobility, often discussed by Gérard (2007, 2010), and Gérard and Ubelmesser (2014). In particular, if the so called *country of origin’s principle* discussed by the same author seems to be more efficient than the *host country* one, it still incentivizes the brain drain phenomenon. The ‘sending’ country (i.e. country of origin), is often paying scholarship fees to their students to study abroad, in the false hope of seeing those students return once they have completed their studies abroad.

Scant literature seems to exist on the causes of returning or staying after studying abroad. Of course, one could say that it is logical and is directly related to economic possibilities and higher salaries, but this argument is not exhaustive. In this sense, the work of Baruch et al. (2007) offers a lot of interesting evidence regarding the inclination to stay abroad after having studied. In particular, they argue that “students’ perceptions of ethnic differences and labor markets, their adjustment process to the host country, and their family ties in the host and home countries all affect their intention to stay”. Combining the ‘push-pull’ model developed by Baruch (1995) and the theory of ‘reasoned action’ by Ajzen & Fishbein (1980), they examined the attitudes and perceptions of 949 foreign students who came to study in the UK and USA.

In an attempt to tackle brain drain, the Republic of Ecuador introduced a new and original scholarship program to finance Ecuadorian students intending to study abroad. The Ecuadorian model stipulates a compulsory return to the home country with the obligation of working ‘at home’ for double the length of time that they spent abroad. If students do not fulfil that condition, they have to repay the entire cost of the scholarship. In exchange, authorities help students to find a job if

²⁷Ireland after the fiscal reform of 1987 and Taiwan in the 1980s (see Docquier, 2014).

necessary. Statistical data shows a return rate of about 90%²⁸, which is somewhat surprising at first glance. On that basis, this work aims to understand that apparently successful outcome and, in particular:

- Brings the Ecuadorian scholarship as a case-study in the literature of financing systems of student mobility;
- Attempts to analyse the mechanism design of this scholarship and see how the return conditions could be a contributing factor in solving the brain drain problem.

The paper is organized as follows: the first session gives a general analysis of the brain drain issue in Ecuador. The second session introduces the scholarship program in detail: data, facts, and institutions. Starting from the *country of origin principle*, the third session describes and attempts to analyze the mechanism design of Ecuador's policy. The fourth session proposes a detailed agenda for research as an extension of 'push-pull' model developed by Baruch (1995). The fifth session concludes this study and presents some tentative lessons for the management of the higher education system on student mobility.

1. The brain drain in Ecuador

As previously discussed, brain drain is a worldwide phenomenon, especially problematic for developing countries that continue to lose skilled young people who decide to migrate to developed countries in search of better opportunities. Latin America is one of the regions where there are few incentives for highly skilled workers to stay in their home country, and Ecuador is one of them.

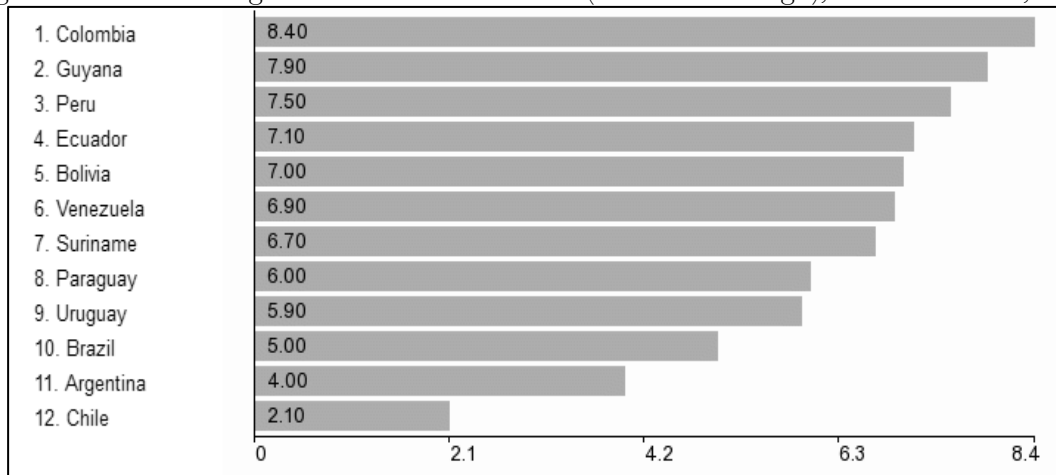
Ecuador is a developing country in the northern part of South America, with around sixteen million inhabitants. Between 2007 and 2014, it experienced a period of significant economic growth and consequent decrease in poverty which was mainly due to the boom in oil prices. It was precisely during this period that Ecuador introduced the scholarship program discussed in this paper, in order to try and invert the brain drain trend with new education policies, aimed at increasing the return rate after studying abroad.

Let me introduce some statistical data. If we look at Figures 1.1, 1.2, and 1.3, we observe the human flight and brain drain indicator from 2007 to 2019. This indicator considers the economic impact of human displacement (for economic or political reasons) and the consequences on a country's development. The higher the index, the greater the human displacement. The average value is 6.56 index points with a minimum of 5.2 in 2019 and a maximum of 7.5 in 2010, and a shows decreasing trend since 2011.

Observing figures for 2007 - Figure 1.1 - the government of the Republic of Ecuador realizes that among the twelve countries in Latin America, Ecuador ranked fourth, from the floor, when the human flight and brain drain index was at stake. Only Colombia, Guyana, and Peru behaved worse, while eight countries performed better: Bolivia, Venezuela, Suriname, Paraguay, Uruguay, Brazil, Argentina, and Chile. Twelve years later, in 2019 - Figure 1.2 - Ecuador has gained four places in that ranking; with only Brazil, Chile, Uruguay, and Argentina achieving better now.

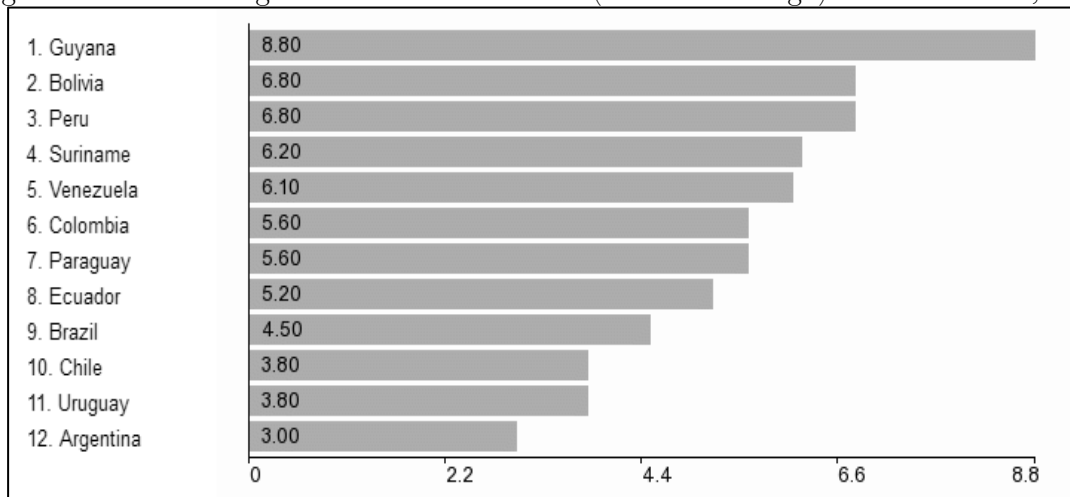
²⁸ SENEYCT 2019 (stands for 'Secretaría Nacional de Educación Superior, Ciencia, Tecnología e Innovación' and is the governmental institution that promotes scientific research and technological innovation).

Figure 1.1: Human flight and brain drain index (0 Low – 10 High), Latin America, 2007



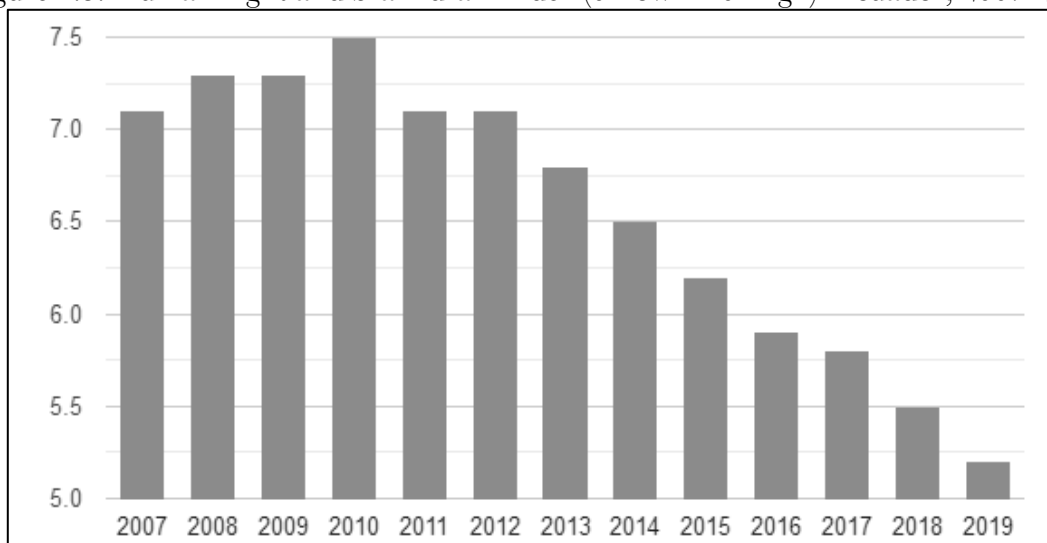
Source: Fund for Peace and author's calculation.

Figure 1.2: Human flight and brain drain index (0 Low – 10 High)- Latin America, 2019



Source: Fund for Peace and author's calculation.

Figure 1.3: Human flight and brain drain index (0 Low – 10 High)- Ecuador, 2007-2019



Source: Fund for Peace and author's calculation.

How can this phenomenon be explained? What happened in between these periods? Why did brain drain decrease- at least in relative terms? This is an interesting observation that calls for a better study of its causes. At first glance, this could be linked with two phenomena: a higher return rate after studies abroad, possibly boosted by the government's scholarship program introduced in 2007, as well as the increasing number of highly-skilled workers coming from Europe after the 2008 economic crisis whom were hired in Ecuadorian universities as professors or researchers.

What is certainly true is that if Ecuador wanted to improve the quality of its capital (e.g. human capital, intangibles), compared to that of its neighboring nations, it had to face a double challenge: on the one hand, to send more young graduates abroad to obtain a master or PhD degree; and on the other hand, to incentivize that extra capital to return home after graduating with their advanced degrees.

2. The Ecuadorian scholarship: data, facts, and institutions

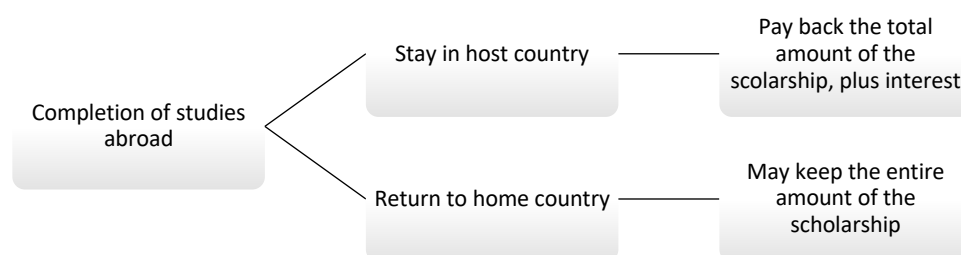
In 2007, Ecuador introduced a new scholarship program for financing Ecuadorian students who intended to study abroad in order to transfer newly-acquired knowledge back to their own country after graduation. As mentioned in the program itself, higher education is one of the most fundamental pillars of the Ecuadorian development model, which has been created to tackle the main difficulties of a developing country: low-skilled workers, especially in the most sensitive and vulnerable sectors of the population. Moreover, the design of this particular type of scholarship has been designed in such a way as to avoid brain drain through a solid incentive to return to Ecuador after the completion of studies abroad.

The requirements of these programs are as follows: a natural person with Ecuadorian citizenship, ≤ 35 years old for master, ≤ 45 years old for PhD, certification of admission to a foreign university, a guarantor whose role is to pay back the entire amount of the scholarship in case the student decides to stay in the host country and does not have the means to repay the scholarship themselves. To obtain the scholarship there is a selection process that includes tests to verify a potential student's capacity for logic, mathematics, verbal expression, and English language ability. With a minimal result of 75% (60% for vulnerable categories), it is possible to progress to the final step- an interview, where the motivation level of the candidate is evaluated.

The Ecuadorian model stipulates a compulsory return to their home country with the obligation of working at home for twice the amount of time spent abroad. If students do not satisfy these conditions, they (or their guarantors) have to repay the entire scholarship plus a fixed amount of interest. In exchange, authorities help the students to find a job, if necessary.

To better understand the functioning of that scholarship device, let us focus on Figure 2.1 which explains the alternatives that the student faces once they finish their studies abroad:

Figure 2.1. The Ecuadorian scholarship path.



Source: author's calculation

It turns out that, *ceteris paribus*, if a student attains a good job abroad that allows them to repay the total amount of the scholarship, they will prefer to stay abroad. Vice-versa, they will choose to return to their home country.

The amount of the scholarship (see Table 2.1) depends on the country of destination, and takes into account the income level of the beneficiary.

Table 2.1. Scholarship maximal amount according to the destination country.

Degree	Latin America and Caribbean	US, Canada, and Australia	Europe, Asia, and Africa
Master (max 2 years)	66,000 USD	103,000 USD	108,000 USD
Ph.D. (max 4 years)	162,000 USD	218,000 USD	204,000 USD
Professional Specialization in Medicine (per year)	38,000 USD	51,000 USD	57,000 USD

Source: Senecyct and author's calculations.²⁹

Over the period of 2007-2018, the Ecuadorian Government funded 11,214 scholarships for both undergraduate and graduate-level students: 26% to study Engineering, 23% for Health and Medical Studies, 16% to Natural Sciences, Mathematics and Statistics, 11% for Social Sciences and Communication, and 7% for I.T. Studies. For more details, see Table 2.2 below.

²⁹Senecyct (2019)

Table 2.2 Field of studies of beneficiaries (2007-2018)

Field of Studies	No. of students	% of total number of outbound students supported by the program
Engineering	2,570	26%
Health and Medical Studies	2,313	23%
Natural Sciences, Mathematics and Statistics	1,589	16%
Social Sciences and Communication	1,096	11%
IT	704	7%
Agriculture, Forestry, Fishery, and Veterinary	594	6%
Arts and Humanities	533	5%
Business, Management and Law	343	3%
Educational Sciences	236	2%

Source: Senecyct and author's calculations.

According to the available data (see Table 2.3), 43% of the beneficiaries chose a country in Europe, Asia or Africa, 35% a country in Latin America and Caribbean, and 22% opted for the US, Canada or Oceania.

Table 2.3. Destination of beneficiaries (region of studies)

Region	No. of students	% of total number of outbound students supported by the program
Latin America and Caribbean	3,450	35%
US, Canada, and Oceania	2,209	22%
Europe, Asia, and Africa	4,319	43%

Source: Senecyct and author's calculations.

The preferred host countries (see Table 2.4) were: Cuba (16%), Spain (15%), UK (10%), US (10%), and Australia (8%). The other destinations were below 5%. It may be useful to highlight the fact that there is a very good and well-known university for Medical Studies in Cuba, '*Escuela Latinoamericana de Medicina*' which is the most highly regarded in Latin America. The fact that the second most popular destination is Spain could be justified by a language-oriented choice.

Table 2.4. Destination of beneficiaries (country of studies)

Country	No. of students	% of total number of outbound students supported by the program
Cuba	1,611	16%
Spain	1,519	15%
UK	1,047	10%
US	1,030	10%
Australia	801	8%
Canada	376	4%
Russia	358	4%
Honduras	343	3%
Netherlands	326	3%
Argentina	281	3%
France	276	3%
Chile	267	3%
Brazil	220	2%
Venezuela	212	2%
Mexico	211	2%
Costa Rica	168	2%
Germany	152	2%
Belgium	130	1%
Portugal	127	1%
Hungary	124	1%
Italy	102	1%

Source: Senecyct and author's calculations.

As previously mentioned, statistical data shows a return rate of about 90%, which is somewhat surprising at first glance. Among the returnees, 34% work in educational institutions, 18% in healthcare institutions, 15% in the private sector, and 14% for governmental institutions.

3. The 'country of origin principle' and the return rate.

As described in the literature by Gérard in 2007 and 2010, among others, we can distinguish two main ways of financing a student intending to study abroad: the *country of origin principle* and the *host country principle*. The first implies that the 'sending country' finances the student's expenses, while in the latter, the 'receiving country' pays for them.

The existing system for financing student mobility, mostly based on the *host country principle*, is neither sustainable nor efficient (Gérard 2007 and 2010, Haupt, Krieger and Lange, 2011). One of the explored alternative solutions to the current *host country principle* is the *country of origin principle*. But, as argued by the same authors, it still appears to be inefficient because of the presence of a positive

externality. However, the outcome of this design is more efficient than the previous one if the probability of returning home after completion of studies is higher than a given threshold³⁰.

To analyze the mechanism design of the Ecuadorian scholarship, we can start with the *country of origin principle* (see Gérard 2007) that is briefly described below, tracing the core parts of the model which are useful in understanding the discussed tool.

Under the assumption of a simple world consisting of two countries (i and j), the *country of origin* model is essentially based on the number of ECTS (European Credit Transfer System) obtained by the student, used as an indicator of the opportunity-cost related to the mobility. Each country wants to maximize their social welfare.

Supposing that the local production function of wealth ($f(x, z)$) is characterized by a technology using locally and internationally educated graduates, the objective function of the government of country i is:

$$W_i = f(e_{ii}, r\beta e_{ij} + (1-r)\beta e_{ji}) - c(e_{ii} + e_{ji}) - w(e_{ii} + e_{ij}) \quad (1)$$

where:

– e is the number of ECTS (European Credit Transfer Scale) where the first subscript indicates the origin country, and the second one indicates the destination country (for studying purposes).

– $\beta \geq 1$ is the ability to contribute to wealth production.

– c is the cost of producing ECTS.

– w is the opportunity cost of dedicating time to getting an ECTS rather than contributing to the current generation of local wealth.

– r is the probability of returning home after the completion of studies abroad.

To determine the number of ECTS e_{ij} (financed students to send abroad), the government of country i has to maximize equation (1) with respect to that latter variable. The equilibrium numbers of ECTS for the *country of origin* principle (O) are then the following:

$$e_m^O = r \frac{\beta}{c + w}$$

where the superscript O refers to *country of origin principle*, and the subscript m refers to internationally mobile students.

The lack of efficiency of this system has to be appreciated with respect to the efficient benchmark below that derives from the joint maximization of $W_i + W_j$ w.r.t $e_{ii}, e_{ij}, e_{jj}, e_{ji}$:

$$e_m^E = \frac{\beta}{c + w}$$

³⁰By ‘more efficient’ they meant that the number of ECTS of foreign students is closer to that generated by the efficient benchmark (see Gérard 2010).

where the superscript E refers to *Efficient*. This lack of efficiency is then due to the presence of an externality:

$$e_m^E - e_m^O = (1 - r) \frac{\beta}{c+w} \quad (2)$$

which is positive anyway and it is the ‘present’ made by the origin country to the host country and consists of a fraction $1-r$ of the financed students remaining in the host country and being productive in the latter. Considering this, as discussed in the introduction, we know that the ‘stay rate’ in the U.S. is around 70% for international students, so it easy to appreciate the magnitude of this ‘loss’.

As previously examined, this brain drain phenomenon is particularly important when students from developing countries decide to study in a university in a developed country, which is the case for Ecuadorian students. The question that then arises is the following: starting from this *country of origin model*, could we reduce the positive externality by increasing the r parameter i.e. the probability of returning home after the completion of studies abroad? The answer seems to be positive and implicitly included in the Ecuadorian program discussed in this paper³¹. In fact, it suggests that it is possible to eliminate the ‘free-riding’ phenomenon better described by Gérard (2012): a country, which may have the studies of the further contributors to its GDP financed by taxpayers of the other country.

Returning to the *country of origin model*, it turns out that if the Ecuadorian model is capable of achieving a targeted return rate r^* of about 0.90, as announced by the authorities, the analyzed inefficiency in equation (2) will be close to zero and completely eliminated as $r^* \rightarrow 1$.

$$e_m^E - e_m^O = (1 - r^*) \frac{\beta}{c+w} = 0.1 \frac{\beta}{c+w}$$

Then:

Proposition 1: *When a government financing a scholarship under a country of origin adopts a constrained scholarship capable of boosting the return rate (r), the generated externality decreases, and the efficiency of the system increases.*

The question now is how does this constrained scholarship influence the students’ final decision to stay or to return. What is the probability of a student who has completed their studies abroad returning to their country of origin? And how could that probability change with the presence of a constraint, such as the one provided by the Ecuadorian scholarship program?

To answer this question, ‘Ecuadorian student behavior’ can be described by utilizing a simple variation of the migration model proposed by Borjas (1987) and repurposed by many authors like Clark et al., 2004. Note that the focus here is only whether to stay abroad, or return home after studies. We do not take into account the first step of a student wanting to study abroad, which is choosing this funding or not.

Let us suppose that a student (i), resident of the country of origin (O), and studying in host country (H), has to decide whether to go back after they complete their studies. Let us suppose that for studying abroad, they received a constrained ‘Ecuadorian-scholarship’ (S). The utility function of the student, and the probability that they will return to their country of origin is described below:

³¹ Other similar programs exist, for example the one applied in the US military force.

$$U_i = w_H(s_i)(1 - \rho_i) + w_O(s_i)\rho_i - \frac{c^2}{2}(1 - \rho_i)^2 S$$

where:

- ρ_i is the probability of returning home.
- $w_H(s_i)$ is the discounted value of the host country's salary, which depends on the students' skills (s_i).
- $w_O(s_i)$ is the discounted value of the country of origin's salary.
- S is the amount of the scholarship received plus interest.
- c is the 'stay-cost' (adaptability, cultural difference etc.).

Looking at the first order condition we have:

$$U'_p = -w_H(s_i) + w_O(s_i) + c^2(1 - \rho_i)S = 0$$

$$Sc\rho_i = Sc^2 + w_O(s_i) - w_H(s_i)$$

$$\rho_i = 1 + \frac{w_O(s_i) - w_H(s_i)}{c^2 S}$$

We can see that, for a given skill level:

- Higher wage rates in the host country and lower mean wages in the country of origin decrease the return rate.
- Higher stay costs increase the return rate.

So, the probability that a student who studied abroad returns home after graduation increases with the difference between the country of origin's wage and the host country's wage. Then:

Proposition 2: *Since the difference between the country of origin's wage and the host country's wage is likely to be negative (because we suppose that the student chose to study in a 'richer' country), the probability of returning home is higher in the presence of a constrained scholarship.*

4. An agenda for research: the “push-pull model”

The push/pull model from Baruch (1995), used to explain the phenomenon of international migration, describes the forces that push or pull one decision or another: namely, whether to stay, or to migrate. The final decision will be a weighted combination of the nature and the direction of these forces. Baruch identifies two main categories that influence the decision; the person's environment, and their societal context and target environment. In particular, their personal background, which includes personal values, needs, preferences, and aspirations, as well as political, social, and economic factors. At the same time, the target environment will be represented by culture, the legal system, and economy, etc.

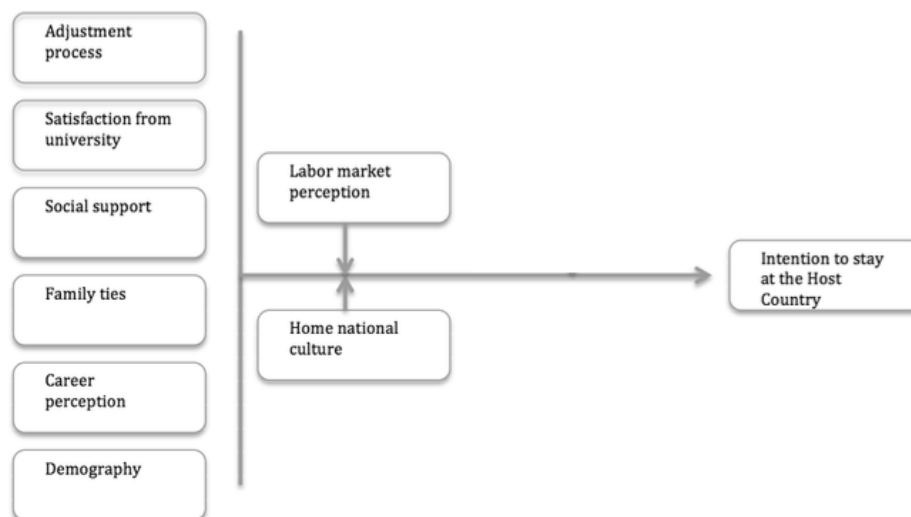
Baruch et al. (2007) developed a new model combining the push-pull model with the theory of reasoned action of Ajzen and Fishbein (1980) for emigration. The theory states that the student's decision to stay or return to their home country after studies will be “positively related to their inclination to do so, which, in turn, will be affected by their attitude. Different factors influence that inclination, for example, culture-shock” (Lee and Mauer, 1999), the “adjustment process when

moving to a different culture” (Shay & Baack, 2004), “the students’ orientation programs” (Martin and Dixon, 1994), and “their level of satisfaction with the university” (Baruch et al., 2007).

Vaiman and Haslberger (2010) argue that another environment has emerged over the past few years: the transnational context. In particular, “whereas before it was a matter of weighing up the advantages and disadvantages of staying vs. (temporarily) migrating, now it is also a matter of the advantages and disadvantages of mobility in general (not any particular geography)”. As they explain, having a ‘mobile background’ nowadays represents a positive quality on a worker’s *Curriculum Vitae*. So the decision to move could also be influenced by this factor.

In particular, in their work, Baruch et al. examined the reasons for international students’ inclination to stay in their host countries from a sample of 949 management students in the UK and US. Among this variety of factors (see Figure 4.1), their results support what they call a ‘three-fold model of factors’ that influences the final decision: the student’s perceptions of ethnic differences and labor markets, their adjustment process to the host country, and their family ties in their host and home countries.

Figure 4.1. Factors influencing the decision to stay abroad (Baruch et al. 2007).



As previously discussed, the Ecuadorian scholarship model analysed in this paper could be a potential candidate for an efficient student mobility financing system, since empirical data shows a high return rate, which is a key-parameter once we move to a *country of origin principle* financing system. The achievement of a high return rate could be explained by the presence of a compulsory return of the entire scholarship funding in the case the student decides to stay abroad after the completion of their studies. In terms of the push/pull model, the presence of the scholarship could be a key *push-factor* (in the sense that it ‘pushes’ the decision to return) that will positively influence the final decision to return to the country of origin. Then, the hypothesis to be tested in further research in the empirical model will be the following; which is Proposition 2 rewritten in a different way:

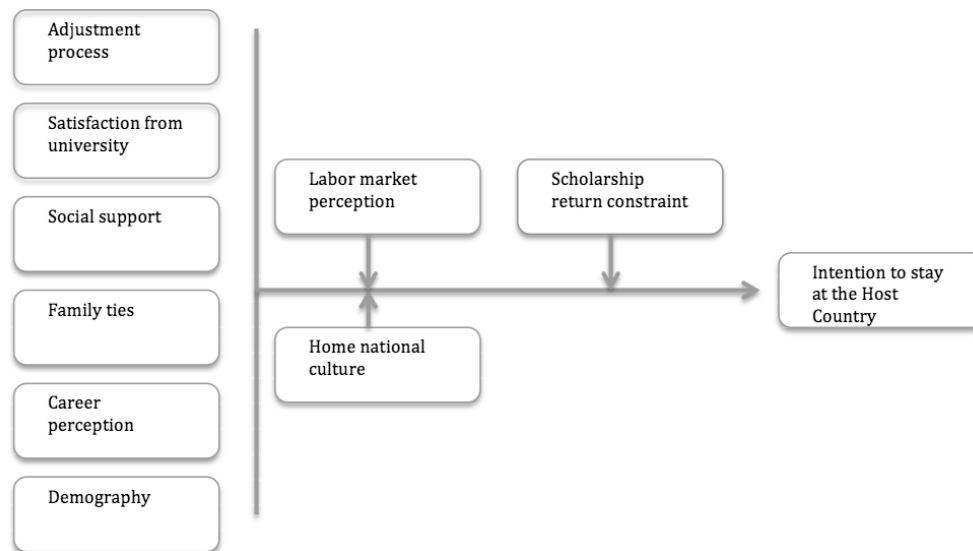
A scholarship with constraint, i.e. a compulsory return to the country of origin after the completion of studies abroad, will be positively associated with the intention of the foreign student to return to their country.

If this hypothesis is empirically confirmed, we can affirm that a country’s financing system that grants a scholarship obliging students to return after the completion of their studies, such as the Ecuadorian

model, increases the return rate, internalizing the positive externality associated to the standard *country of origin principle* financing system.

The extended push/pull model of the Ecuadorian system will then consider, among other factors, the presence of this important constraint: the constrained scholarship. Then the following model is proposed to be tested (Figure 4.2).

Figure 4.2. The Ecuadorian push/pull model to be tested.



Source: author's elaboration.

The main idea for the empirical part is to test whether the presence of this constraint represents the main *push-factor* for the Ecuadorian students who decided to study abroad taking advantage of the government's scholarship.

Conclusions and remarks

Globalization has several implications for the students' and skilled-workers' mobility, and fosters the phenomenon of brain drain that, as discussed, is especially disadvantageous for human capital in developing countries.

We have seen that, although the *country of origin principle* seems to be more efficient than the *host country principle*, it still produces an externality represented by a brain drain. A new case study was proposed with a detailed analysis of the Ecuadorian financing system of student mobility that introduced an important incentive to return home once qualified. In theoretical terms, what follows has been shown, which constitutes a tentative lesson for public policy. The probability that a student who studied abroad returns home after graduating increases with the difference between the country of origin's wage and the host country's wage. Since this difference is likely to be negative (because we suppose that the student chose to study in a 'richer' country), the probability of returning home is higher in the presence of an Ecuadorian constraint. So it seems that the Ecuadorian device acts as a strong incentive that fosters the return rate and helps in combatting the brain drain phenomenon. It is necessary to remark that this paper did not intend to analyze the efficiency or the sustainability of the system. Additional research is required in order to answer these two questions.

Finally, an agenda was presented for research introducing the *push-pull model*, and a proposal for a new extension that includes the scholarship as a *push-factor*. More about this data needs to be said in order to test whether the presence of the scholarship constitutes a *push-factor* for Ecuadorian students. A database with 500 observations is already available and will be used for this proposed further research.

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3. Push-pull factors influencing the decision to stay abroad after studies: the role of the Ecuadorian return-contingent scholarship³²

Abstract

The aim of this work is to analyse the factors influencing Ecuadorian students' decision to stay abroad after completing their studies. In developing our hypotheses, we relied on the push-pull model proposed by Baruch et al. (2007). One significant addition to this model is the hypothesis that the return-contingent scholarship implemented in Ecuador can serve as a *push* factor. This device, introduced in 2007, requires recipients to return to their home country upon completion of their studies. Failure to do so will result in the obligation to repay the scholarship amount plus interest. The institutional data shows a return rate of 90%, which is quite surprising. This study, based on a survey analysis demonstrating a similar return rate of around 93%, aims to gain a deeper understanding of the impact of the Ecuadorian return-contingent scholarship, among other factors, on the decision of Ecuadorian students to stay abroad after their studies. The analysis also addresses the endogeneity issue caused by self-selection, as students may anticipate the possibility of staying abroad when deciding to apply for the scholarship.

³² I want to thank Professor Paul Belleflamme and Professor Vincent Vandenberghe for their insightful suggestions.

Introduction

In the current globalised world, in line with the increasing number of mobile students, many students decide to remain in the country where they are studying for a considerable time. This is particularly valid for those from developing countries, where the quality of education is lower, which makes studying abroad a more attractive and beneficial option for talented individuals. However, when these individuals choose to stay or work abroad, their home countries experience a loss of skilled labour, which often results in reduced income taxes for the government, especially if the student mobility financing system is based on a country-of-origin principle. The students are funded by their home country with the hope of their return, while only benefiting host countries (Gérard 2007, 2008, 2012; Gérard and Uebelmesser, 2014; Gérard and Sanna 2017). One proposed solution to address this issue has been the Bhagwati tax. The tax is designed to address the global inequality in labour mobility and provide compensation to poorer countries for their investments in education. However, implementing this tax presents challenges and entails significant administrative costs. Additionally, it may create disincentives for education and mobility (Docquier and Ropoport, 2012). The literature (Kemple and Snipes, 2000; Barr, 2004; Chapman and Ryan, 2002; Chapman, 2006) thoroughly analyses income-contingent loans as a potential solution to inefficiencies. By reducing financial risk, income-contingent loans can improve student financing systems, making higher education more accessible to a wider range of students (Chapman, 2006). However, establishing such a system is complex, given the challenges and costs of administration needed to set up and maintain it, especially in international or cross-border contexts (Chapman, 2006; Woodhall, 2004; Barr, 2004). Additionally, tracking income in countries with different tax systems and labour market conditions poses significant difficulties. These challenges are particularly acute in developing nations where administrative capabilities may be limited.

Education is a crucial factor in the talent competition, allowing countries to attract international students. Nations try to improve the quality of their educational programs, hoping to increase the number of talented students who can contribute to the economy through income taxes and consumption. The goal is to encourage these students to remain in the country and join its workforce after completing their higher education. As Storesletten (2000) pointed out, one way to address the challenge of increasing demand for highly skilled workers in the future labour force is to promote the immigration of talented students from abroad who can stay in the host country after graduating. Several countries have recently introduced changes to their education and immigration policies to increase the proportion of international students who stay after completing their studies.

In the current climate of talent war, developing countries funding their students' programs abroad need to establish conditions that incentivise participants to return. In this regard, Ecuador has developed a distinctive method to finance student mobility: a return-contingent scholarship that encourages them to return home with their knowledge after graduation. The government has imposed a significant restriction on this device. If students fail to meet the requirement to return home after completing their studies abroad, they will be required to repay the total amount received, plus interest. Sanna (2022) presented this device as a case study in the literature on financing systems for student mobility. According to the study, the program has a return rate of approximately 90%, which is remarkably high. As argued, the program has also been associated with an improvement in Ecuador's human flight, human displacement, and brain drain indexes when compared to other countries in Latin America³³.

Over the years, economists who study education have investigated the issue of brain drain. While there is extensive research on why people migrate to other countries for study or work purposes, there

³³ Fund for Peace.

is limited information on the factors that determine whether students will return home after completing their studies, especially at a micro-level. One of the main contributions to the literature on factors influencing mobile students' decisions is Baruch's push-pull model for international migration (1995). This model analyses the forces that either push or pull a person towards the decision to migrate. The final decision will combine the nature and direction of these forces, including personal background and political, social, and economic factors. Baruch et al. (2007) developed a new model that combines the push-pull model (push to return home and pull to stay abroad) with a psychological dimension, the theory of reasoned action of Ajzen and Fishbein (1980), to analyse the inclination of students from five universities in UK and US, to stay abroad after their studies. In drawing their hypotheses, Baruch et al. (2007) rely on the empirical literature, and their results show the significance of students' perceptions of the host country, such as labour and career opportunities, satisfaction levels about the studies abroad experience, and relations as crucial factors influencing their decisions. Other factors analysed in the literature include culture (Lee and Mauer 1999; Shay and Baack 2004), students' programs (Martin and Dixon 1994), and enhanced skills acquired through studying abroad (Vaiman and Hölzle 2013). Other previous migration studies regarding push-pull effects are those of Ravenstein (1885) and Lee (1966). This latter work states that negative push factors and positive pull factors affect people's decisions to leave or stay in a location.

On this basis, this paper aims to investigate the factors that influence Ecuadorian students' decisions to remain in foreign countries after completing their studies. To do so, inspired by the push-pull model designed by Baruch et al. (2007), it examines the satisfaction and perceptions of students in the host country and the university experience, alongside homesickness, while including the Ecuadorian scholarship as a potential push factor (push to return home). Through a survey analysis of Ecuadorian students, demonstrating a return rate of 93%, closely aligned with that reported by Ecuadorian institutions, this study seeks to understand the role of this scholarship, alongside other factors, in their decision to stay abroad after completing their studies.

The analysis addresses the endogeneity issue caused by self-selection, which may partially explain the high return rate, as students may already consider the possibility of staying abroad when deciding to apply for the scholarship. To do so methodologically, after a detailed discussion of the descriptive statistics of the sample, we adopt a twofold counterfactual approach, allowing us to observe differences and mitigate potential self-selection bias for observable variables. First, we employ a logit regression to examine the influence of various factors on this decision, including the receipt of the scholarship. Second, to strengthen the analysis and to compare the results, we use propensity score matching to assess the impact of the scholarship, which is considered the treatment. While it is true that both methods address selection bias only for observed covariates, the richness and granularity of the dataset, including detailed pre-treatment characteristics, help ensure that most of the relevant confounders are accounted for. Therefore, the residual risk related to unobserved factors is expected to be limited and does not invalidate the main interpretations, although further research could explore this aspect more deeply.

Results show that higher levels of homesickness for one's home country negatively influence the likelihood of staying abroad after studies. Thus, homesickness regarding the country acts as a push factor (pushing individuals to return home). Conversely, perceiving better opportunities in the host country increases the likelihood of staying abroad. Thus, it acts as a pull factor (pulling individuals to stay abroad). These results partially confirm Baruch et al. (2007) work findings. Moreover, both empirical methodologies confirm that the scholarship acts as a *push* (push to return home) factor: receiving the scholarship decreases the likelihood of staying abroad after completing the studies. Important insights also support this latter result. A significant portion of returnees, that is, scholarship recipients who decided to return home, declared that the scholarship discouraged them from staying abroad and that they would have stayed abroad if a firm had reimbursed the scholarship. Additionally,

the tool behaves in a manner that we expect from a financial incentive, such as a scholarship: to have a more substantial effect on students who declare a lower family income.

Nevertheless, the tool's design and our data suggest that the scholarship program raises concerns about fairness and efficiency. On the one hand, data show that some students choose not to apply due to the lack of a guarantor, which may exclude specific financial backgrounds and limit qualified applicants. On the other hand, a significant portion of students who have studied abroad did not apply for the scholarship because of the penalty, probably anticipating the possibility of staying abroad.

The paper is structured as follows: Section 1 briefly describes the scholarship device; Section 2 outlines the conceptual model and research hypothesis; Section 3 details the survey and presents the statistical analysis of the gathered data; Section 4 presents the results of the empirical analysis; the final section concludes the paper with a summary of findings and discussion.

1. The Ecuadorian return-contingent scholarship

In 2007, the Republic of Ecuador launched a financial aid program for students who wish to pursue higher studies abroad, especially for master's and PhD programs. This return-contingent scholarship aims to increase the number of students who return to Ecuador after their education abroad, thereby enhancing the quality of education and preventing the brain drain phenomenon. As already said, the return rate declared by the Ecuadorian institutions is remarkably high (90%).

To qualify for the scholarship, applicants must meet specific criteria. For example, there is an age limit of 35 years for master's programs and 45 years for PhD programs, and applicants must pass tests to verify their logical reasoning, mathematical skills, verbal expression, and English language proficiency. The minimum score required for each test may vary for vulnerable categories.

This scholarship has a unique requirement that sets it apart from others. It obligates students to return to Ecuador upon completing their studies. The scholarship model stipulates that students must come back to their home country and work there for twice the duration of the time they spent studying abroad. This requirement ensures that students use their newly acquired skills and knowledge in their home country and contribute to its development.

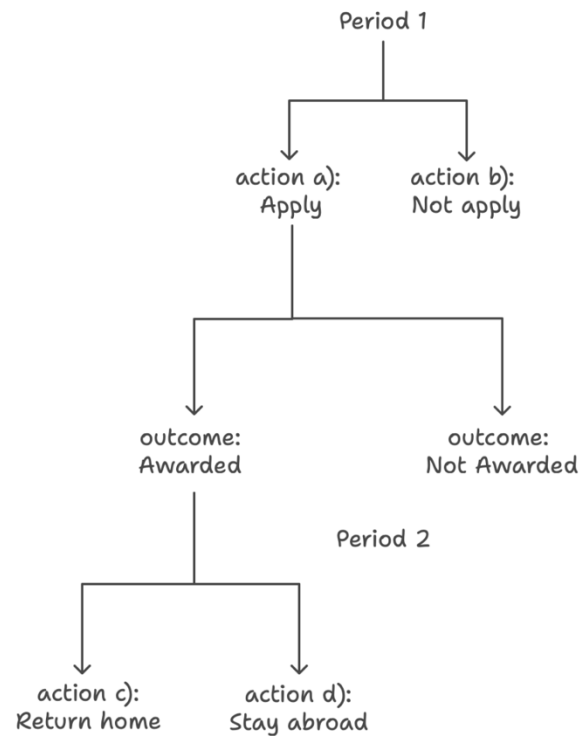
It is important to note that this scholarship condition has consequences for those who decide to stay abroad after completion of their studies: students or their guarantors must repay the total scholarship amount plus interest if they fail to meet the requirements. The interest rate varies over the years³⁴, and it is lower than the interest rate of standard credit for consumption.

The total repayment of the scholarship plus interest is a significant factor to consider for an Ecuadorian student. The amount of the scholarship given to study in a country where the cost of living is higher than in Ecuador significantly impacts the student's budget. For example, in 2018, a student received up to \$66,000 to study for a master's program in another Latin American or Caribbean country (Sanna, 2022), while the average salary in her country was around \$700 per month (INEC, 2018).

³ In 2007, the interest rate was 8% (Senecyct), student loan interest rate fluctuated around 8-12%, and the interest rate for consumption loans fluctuated around 12-14% (Central Bank of Ecuador).

To better understand the scholarship mechanism, let us focus on the Ecuadorian student decision as described in Figure 1.1. As we can see, the student who desires to study abroad faces two decisions at two different times: Period 1 and Period 2 (Figure 1.1).

Figure 1.1. The Ecuadorian student's decision.



Source: author's elaboration.

In period 1, according to her distinctive characteristics, the student can either apply (*action a*) for the scholarship or choose not to apply (*action b*). In period 2, depending on the outcome of the application (i.e., whether she was awarded the scholarship), the student has the option to return to her country (*action c*) and then receive the home salary in addition to the scholarship already received or stay abroad (*action d*), receiving a supposedly higher wage and paying back the total amount of the scholarship plus the interest.

According to the path described above, we can then have three different types of students wanting to pursue higher education studies: *b*) those who will choose not to apply and study at home; *c*) those who will choose to apply, study abroad and decide to come back after their studies; and *d*) those who apply, study abroad and stay abroad.

It is important to note that the design of the scholarship program influences the composition of the groups, creating an issue of endogeneity. In the first period, students decide whether to apply for the scholarship, and this decision may be made with anticipation of their future choice to stay abroad or return home. Consequently, the penalty imposed on those who do not return home after their studies affects students' behaviour in such a way that a more severe penalty may lead to more students who were awarded the scholarship choosing to return home, but it could also discourage potential applicants from applying in the first place. Moreover, a category of students who cannot find a guarantor, which is one of the requirements, do not apply a priori. Absent this requirement, they might have applied, studied abroad, and returned.

As already stated, the fact that some students decided not to apply because of the lack of a guarantor and the obligation to return may raise concerns about the fairness and efficiency of the tool. However, as we will see, our data provide some initial insights but do not contain sufficient information to assess these issues rigorously. Addressing this question would require a more comprehensive approach than the current study allows. Specifically, it would involve collecting data from a different perspective: that of applying or not, instead of returning or not, and then from a broader sample of students who were interested in studying abroad but were discouraged from applying due to these scholarship requirements. We will keep these intuitions for further research.

2. The conceptual model and the research hypotheses

Let's now turn to the conceptual model and the research hypotheses, which are based on Baruch et al.'s (2007) brain drain analysis. Their research, inspired by Baruch's push-pull model and Ajzen and Fishbein's theory of reasoned action for immigration (Ajzen and Fishbein, 1980), highlights the factors that impact foreign students' decision to stay in a foreign country. As discussed above, they show that this inclination is significantly influenced by students' perceptions of ethnic and labour market differences, adjustment to the host country, and relation ties.

This study aims to provide fresh insights into the factors affecting the rate of students staying abroad after their studies. The hypotheses proposed in this research are like those tested in the literature, especially in Baruch et al. (2007)'s work. Still, a new and significant hypothesis is introduced in this paper, which suggests that the Ecuadorian return-contingent scholarship can act as a *push* factor (push to return home). The proposed conceptual research model is described in Figure 2.1, and the hypotheses to be tested are the following:

Hypothesis 1: *Higher levels of homesickness negatively influence the probability of staying in the host country (push factor).*

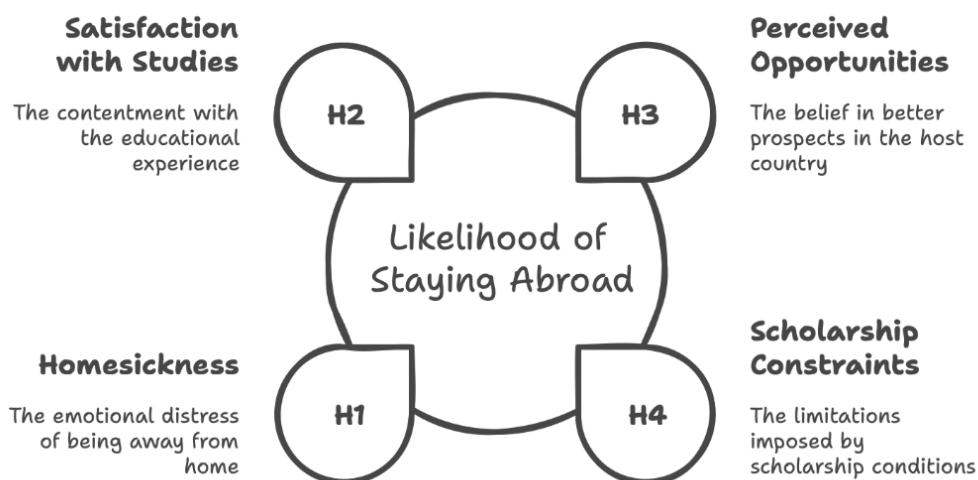
Hypothesis 2: *Higher levels of satisfaction about the experience of studying abroad positively impact the likelihood of staying in the host country (pull factor).*

Hypothesis 3: *Higher perceptions of better opportunities in the host country positively impact the likelihood of staying in the host country (pull factor).*

Hypothesis 4: *The fact that one has been financed through the Ecuadorian return-contingent scholarship negatively affects the probability of staying in the host country (push factor).*

In summary, this research design examines two opposing forces: those related to perception and satisfaction levels, which can be considered *pull* factors (pull to stay abroad) according to Baruch's work, and those related to homesickness and the fact of having received the scholarship, which can be considered *push* factors (push to return home). However, along with all the work, particular importance is given to analysing the scholarship's effect.

Figure 2.1. Factors influencing Ecuadorian students' decision to stay abroad



Source: author's elaboration.

3. The survey and the statistical analysis

We conducted a survey in 2019-20 to investigate the factors influencing Ecuadorian students' decision to stay abroad after studies and assess the effect of Ecuadorian scholarship as a *push* factor. We used convenience sampling through social media platforms, specifically targeting members of various Facebook groups of Ecuadorian students and ex-students who were studying or have studied abroad and in Ecuador. This allowed us to reach participants who were easily accessible and willing to respond, leveraging the extensive network and engagement of users on these platforms. Ecuadorian students and ex-students were invited to participate in an online questionnaire. No incentives were offered to the participants.

The questionnaire was posted in over 30 Facebook groups consisting of Ecuadorian students in various countries³⁵ and Ecuador. This had the potential to reach around 30,000 subscribers³⁶. From this, 466 students completed the questionnaire in its entirety, of which 361 were studying or have studied abroad. As said by the available data, the population of Ecuadorian students abroad was estimated at 6,000 in 2015 and 7,000 in 2016³⁷. Accordingly, we should have a sufficiently engaged sample.

It is necessary to note that because the sample is drawn from Facebook groups, a risk of a potential sampling selection bias may exist in this survey. Facebook may not represent the entire population of Ecuadorian students abroad, potentially skewing the results towards those who are active on social media and more likely to engage with such platforms. However, this potential bias is likely low because the survey posting covered a wide range of groups, including both current and former students. Moreover, the penetration rate of Facebook in Ecuador oscillated between 44% and 79% during the

³⁵ To select the groups, the criteria were to search “*Estudiantes ecuatorianos en...*” and the host countries of preview beneficiaries, as detailed by Sanna (2022). Moreover, the questionnaire was posted in some local groups, such as “*Red de Investigacion Ecuatoriana*.”

³⁶Please note that a student may belong to more than one group.

³⁷ Senecyct.

period January 2019 to December 2020³⁸; that is, between half and three quarters of the Ecuadorian population was on Facebook during the period of your survey.

As already stated, the return rate of the students granted the scholarship declared by the Ecuadorian government was 90%, which is surprisingly high. Our sample confirms a similar return rate among scholarship recipients (around 93%), which suggests that our sample is likely to be representative of the broader population.

The survey questionnaire covered the following aspects:

- The students' characteristics: age, gender, civil status, ethnic origin, socio-economic situation, education, experiences abroad, and language knowledge. By controlling for these variables, which may influence the overall educational outcome, we can better understand the impact of other factors on students' choices (those related to the hypotheses).
- Students' parents' educational level, experiences abroad, and language proficiency. The literature shows that parents' educational levels affect the resources, aspirations, and motivations of students to engage in international education. Educated parents are more likely to understand the long-term value of international education (see, for example, Perna (2006) and Bilecen and Van Mol (2017)).
- Current situation of the students: whether they were studying in Ecuador or abroad, working, or looking for a job. Depending on their answers, a set of questions specifically related to their studies abroad was asked. These questions included:
 - Financing details (especially whether they applied for (or not) and whether they were awarded (or not) the scholarship).
 - The characteristics of the study program abroad: field of studies, degree program, country, number of years of the program, and language of the program.
 - The students' satisfaction with various aspects of their studies abroad and their levels of homesickness. These questions are those linked to the hypotheses to test, detailed in Section 2, which rely on Baruch et al. 2007's work.
 - Their decision to return home or not, and the reasons behind their decision. This information is especially necessary to build our dependent variable.

Let us now shift our focus to the results of the statistical analysis.

3.1. Students' profile

The students were asked for their age, referring to the age at which the questionnaire was completed. Most respondents, 58.29%, fall between 23 and 36, while 34.57% are between 37 and 43. The median and mean age is 36, with a small percentage being over 43. It is important to note that Ecuadorian students who study abroad (whose average age is 34.66) tend to be older due to the length of their bachelor's program, as they typically pursue a master's or PhD abroad. Conversely, the mean age for current students in Ecuador is 31.33.

The gender distribution is reasonably even, with 51.93% female and 48.07% male. 50.43% of the students were single, 33.69% were in a relationship with an Ecuadorian partner, and the remaining 15.88% were in a relationship with a non-Ecuadorian partner. Most respondents (93.53%) identified themselves as Mestizo, meaning they have mixed Amerindian and European heritage. In Ecuador, Mestizos make up around 75%³⁹ of the entire population, and the percentage is much higher if we

³⁸ Global Stats (2019-20)

³⁹ INEC, Ecuador.

consider the students pursuing higher education. The underrepresentation of Afro-American and Indigenous people is likely to stem from socio-economic factors such as limited access to education.

Almost 75% of students came from the 10 wealthiest provinces of the country, with 51% hailing from the wealthiest 5 provinces. Due to the country’s significant social division and inequality, the asymmetric distribution of respondents cannot be attributed solely to the sampling method. In fact, the majority of respondents, 58.58%, declared a middle income, which aligns with the population distribution: a significant proportion of students pursuing higher education belongs to middle-income families⁴⁰. Lower-middle and upper-middle incomes were reported by 19.53% and 17.17% of respondents, respectively. Only a few respondents declared a low income (4.5%), while rare declared a high income. 79.83% of respondents had a family of 2.4 people, 13.09% lived alone, and the rest lived with 6 or more people.

In Ecuador, wealthy families often choose to enrol their children in private schools due to the country’s overall low quality of education. This trend is observed not only at the primary school level but also at the high school and university levels. Most students were enrolled in private high schools (53.15%) and public universities (56.16%); 38.39% were in public high schools, and 38.01% were in private universities. The remaining students were enrolled in mixed institutions.

Regarding academic performance before studying abroad, 49.14% of the respondents considered themselves very good students, while 36.48% rated themselves as excellent and 14.38% as good or regular. Students were also asked to declare if they knew English and another language. The majority knew English (82.40%), and 48.93% also knew another language. Moreover, from the literature on student mobility, a variable to analyse previous experience abroad was included: 55.58% had no experience, 31.55% had studying experience, and 12.87% had working experience.

As explained above, parents’ education and “internationality level” affect student mobility. Therefore, students were asked several questions on this topic. First, they were asked to indicate the parents’ educational level (see results in Table 3.1).

Table 3.1. Parents’ education level

Education	Mother	Father
Primary school	15.02	13.95
Secondary school	36.48	26.61
Bachelor	35.84	40.34
Master	11.59	15.67
PhD	1.07	3.43

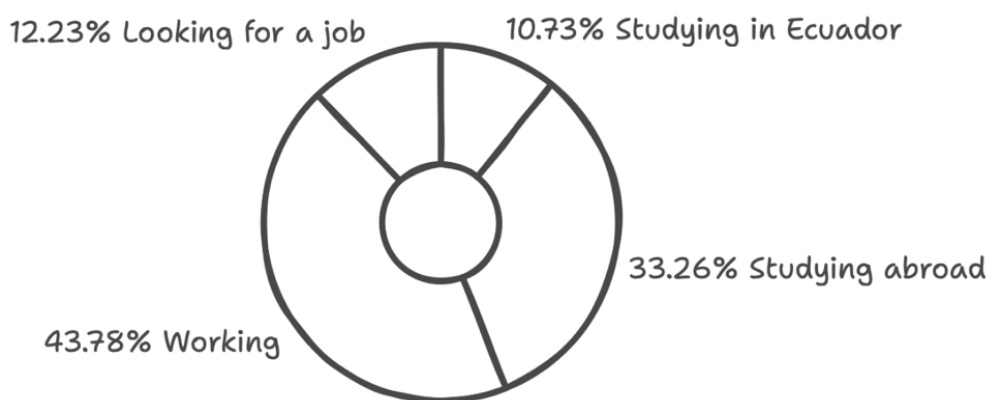
⁴⁰ Rieckmann et al. (2021)

Most of the students' mothers completed secondary school, while the majority of their fathers hold a bachelor's degree. In terms of international experience, 62.02% of parents had no experience abroad, 25.11% had work experience, and 12.87% studied abroad. In terms of languages, 74.68% reported not knowing English, and 88.20% reported not knowing any other languages.

3.2. Students' current situation

Let us now provide information about the student's situation at the time of the survey (Figure 3.1 below and Table 3.2 in the Annexe).

Figure 3.1. Students' current situation



33.26% were studying abroad, 10.73% were studying in Ecuador, 43.78% were working, and 12.23% were seeking employment. Consequently, the survey proceeded in separate ways according to the specific category the respondent belonged to at the time of the survey:

- (a) The students studying in Ecuador were only asked whether they wanted to study abroad and the reasons behind their decision.
- (b) The students studying abroad were given a set of questions to answer, which would help in analysing the factors that influenced their decision to stay abroad.
- (c) and (d) The survey asked students who were seeking employment or working whether they studied in Ecuador or abroad, and posed the questions that follow accordingly: (a) or (b).

If we consider the entire sample along with the sub-questions (a) and (b), the database displayed that 361 respondents (77.47%) have studied or were studying abroad, while 105 (22.53%) in Ecuador. Out of those who either studied or were studying in Ecuador, 18.18% stated that they preferred not to leave the country, while 14.14% mentioned that they applied for the scholarship but were not accepted. Additionally, 15.15% did not apply due to the lack of a guarantor, which is required for the scholarship to ensure the return of the amount and interests. 16.16% did not apply because they were obliged to return to Ecuador after completing their studies, and the remaining part did not declare the reasons.

3.3. Students' program abroad

Figures 3.2 and 3.3 below (and Tables 3.3 and 3.4 in the Annexe) present helpful information regarding the degree programs and fields of study students pursued. According to the data, it can be observed that the majority of students (59.35%) pursued master's programs. In terms of fields of study, 24.14% of students pursued Engineering, 17.67% pursued Economics and Management, 13.15% pursued Health Sciences, 9.70% pursued Social Sciences, and 8.19% pursued Environmental Sciences. The rest of the faculties had less than 8% of the total students.

Figure 3.2. Degree Programme

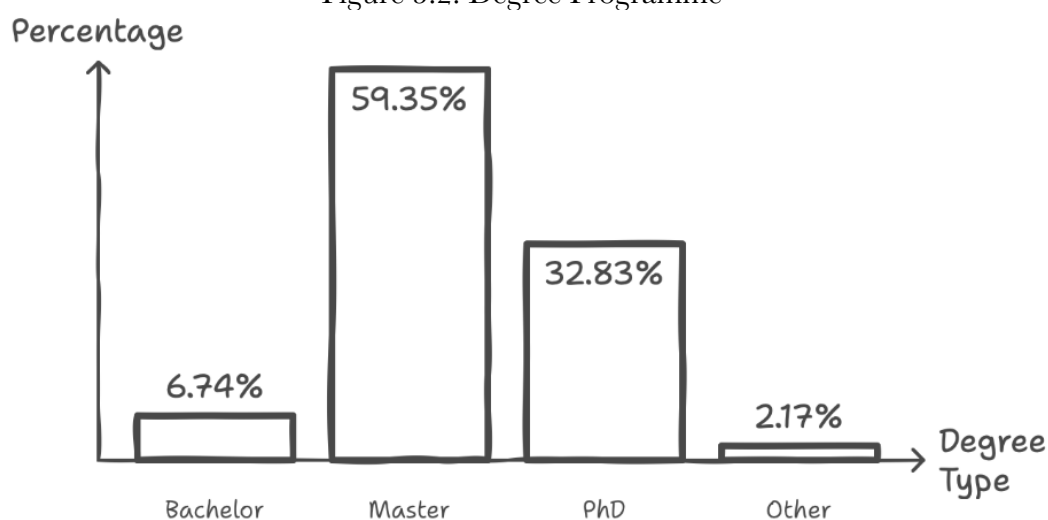
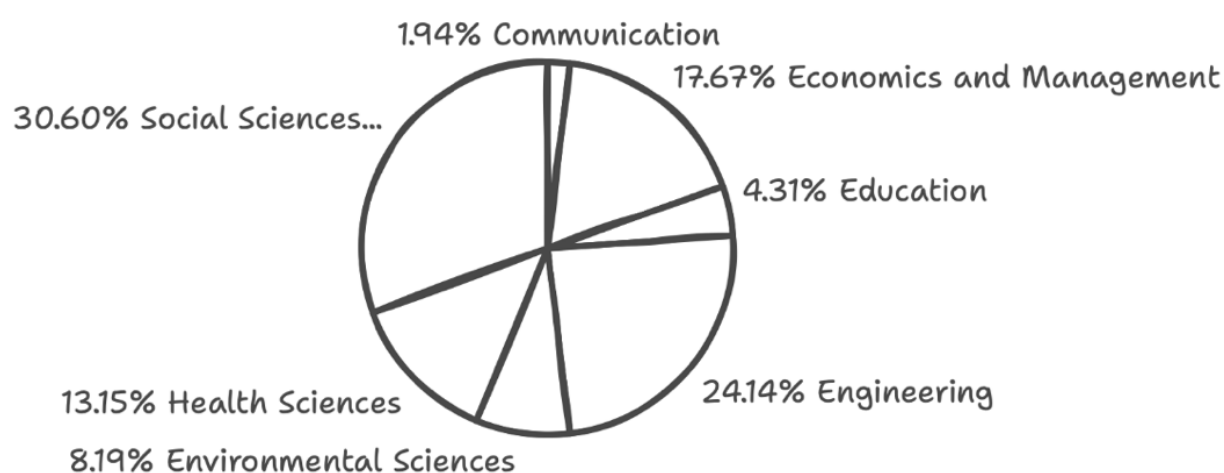


Figure 3.3. Field of studies



The majority of students declared English and/or Spanish as the principal language of their program, with 37.33% and 28.69%, respectively. The average length for these programs was three years. Information regarding the country where students studied was also requested, but only from those who reported studying abroad. Additionally, they were asked for the name of their university, although that information will not be related here. Figures 3.4 and 3.5 below (and Tables 3.5 and 3.6 in the Annexe) show that most students were enrolled in European universities (66.39%), with Spain

being the most popular choice (23.89%). This may be due to language preferences. Data for countries with less than 1.5% of students is not reported.

Figure 3.4. Continent of studies

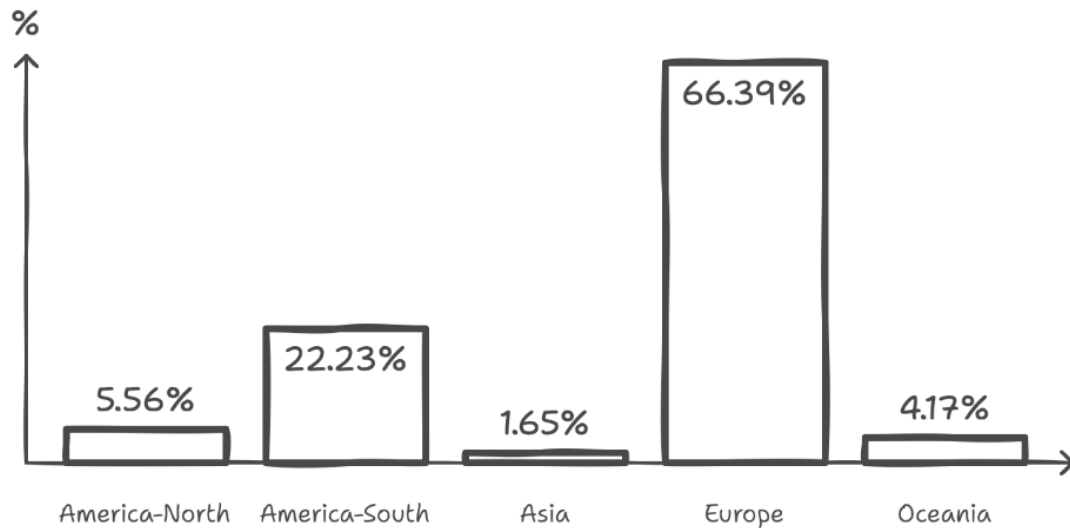
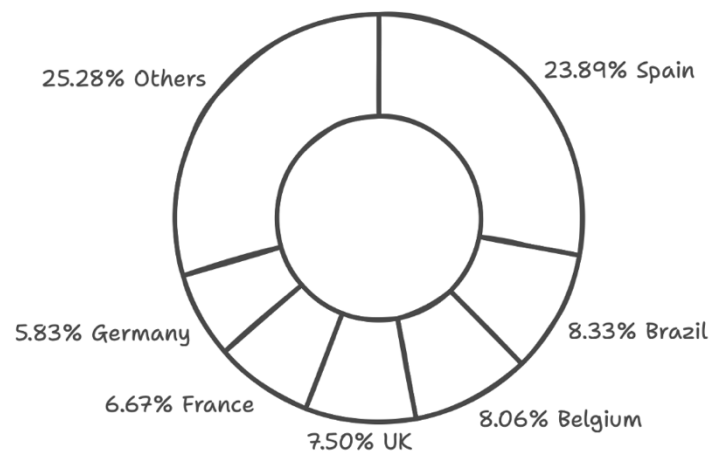


Figure 3.5. Country of studies



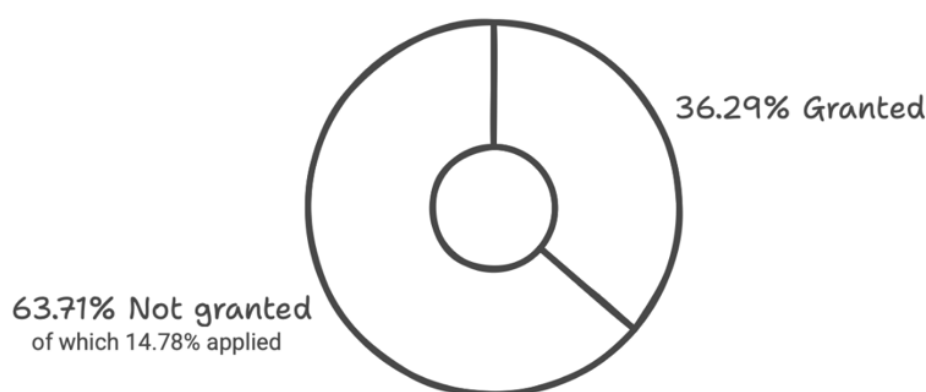
A new dummy variable indicating whether a student has studied in a country with a high stay rate was created. These countries usually include Anglo-Saxon countries such as the UK, US, Canada, and Australia⁴¹. This variable helps to isolate the effect of studying in these countries in the analysis. Approximately 17.22% of the students fall under this category.

⁴¹ Van Bouwel, 2010; Felbermayr and Reczkowski, 2014; Van Bouwel and Veugelers, 2014.

3.4. The Ecuadorian scholarship

Let us take a look at the statistical information related to the Ecuadorian Scholarship (Figure 3.6 below and Table 3.7 in the Annexe). The students were required to indicate where they applied for the scholarship and whether they were granted or not. If not, they had to specify the source of funding for their studies abroad. Out of the total sample of students studying abroad (361 students), 131 (36.29%) were financed by Senescyt, while 230 (63.71%) were not. The majority of unfunded students relied on foreign scholarships (38.30%), personal or family savings (33.62%), contingent loans (16.60%), or employer sponsorship (8.94%). Only a small percentage (2.54%) received an alternative Ecuadorian scholarship.

Figure 3.6. Ecuadorian Scholarship



Out of the students who did not receive financing, 34 (14.78%) applied for the scholarship but were not awarded it, indicating that only a small number of financially unfunded students applied for the scholarship. This could be due to a sampling bias or a bias in the students' responses (maybe unsuccessful students choose not to admit failure), but it does indicate that the scholarship is not being used to its full potential. Nevertheless, not all students can access the scholarship⁴². As it will be discussed in the following section, the empirical analysis will try to assess, among others, the effect of the scholarship mitigating a possible self-selection bias that may exist in the composition of the two groups that may be reflecting a potential endogeneity problem for which in the first period the student chooses to apply or not anticipating the decision to stay abroad or not.

3.5. Studying abroad's perceptions and decision to stay or return

To analyse the determinants of students staying abroad after completing their studies, a series of questions were asked regarding their satisfaction with the host country and their feelings about relationships. The reliability of the scale was tested using Cronbach's alpha test. The satisfaction level (SL) variables had a high scale reliability coefficient of 0.92. On the other hand, the variables measuring the extent of homesickness (family, friends, and country) had an acceptable reliability coefficient of 0.79. Table 3.9 provides a summary of the principal statistics for these variables.

The final section of the questionnaire focused on the decision of students who studied abroad to remain in a foreign country or return home. The students were asked about their decision-making process, including their initial decision before going abroad. They were also asked a significant question that we called "the big question": if a company offered to hire them and repay the full

⁴² Sanna (2022)

amount of their scholarship plus interest, would they choose to remain abroad? The results of this section are presented in Table 3.8 below.

Based on the table provided, it appears that most students of the sample returned (or planned to return) to their home country after completing their studies abroad (68.98%); 21.33% of students stayed (or expressed a desire to stay) in their host country, while 9.69% were uncertain about their future plans at the time of the survey because of Visa and job possibilities. Since the primary interest of this work is to know the students' intention to stay abroad, it is reasonable to interpret indecision conditioned to exogenous factors such as Visa regulation or job possibilities in the host country as an intention to remain abroad. Accordingly, the return rate could be lower. It is important to note that the answers encompass the intention to return or stay, including responses from students currently studying abroad and those who have already finished their studies. Emotional factors or a sort of "patriotism" may then influence these intentions.

63.59% of respondents planned to return home as their original intention. Regarding the "big question" answers, it was observed that the majority of students (72.54%) stated they would have remained abroad if a company had paid the penalty on their behalf (which is to say that no penalty was imposed). Of these respondents, 43.80% cited job opportunities, and 24.81% stated quality of life as the reasons for their affirmative response. On the other hand, 27.46% declared that they would have returned home regardless. Out of this group, 19.77% justified their decision based on a preference for their country of origin.

Table 3.8. Reasons to stay abroad or return.

<u>Question:</u> <u>For category (b):</u> Will you come back home after completing your studies abroad? <u>For categories (c) and (d):</u> Have you returned home after studying abroad?	<i>Number of students</i>	<i>Percent</i>
Yes	249	68.98
<i>Because of the penalty of the Scholarship</i>		39.89
<i>Because of the difficulties associated with Visa</i>		2.49
<i>Because here it is difficult to find a job</i>		5.27
<i>Because I have my family in Ecuador</i>		4.43
<i>Because I miss my family, friends and country</i>		7.48
<i>Because of other reasons</i>		9.42
No	77	21.33
<i>I will remain for study purposes</i>		1.94
<i>I will remain for work purposes</i>		19.39
I still have to decide whether to go back home or not	35	9.69
<i>It will depend on Visa possibilities</i>		1.11
<i>It will depend on work possibilities</i>		8.58
<u>Question:</u> Your original intention was to return home after finishing your studies abroad?		
Yes	227	63.59
No	45	12.61
Didn't know	85	23.81
<u>"Big question":</u> <u>For category (b):</u> If a company offers to hire you and repay the full amount of the scholarship plus interest, would you choose to remain abroad? <u>For categories (c) and (d):</u>		

If a company had offered to hire you and repay the full amount of the scholarship plus interest, would you have chosen to remain abroad?	<i>Freq.</i>	<i>Percent</i>
Yes	214	72.54
No	81	27.46

Looking at Table 3.9, we can see the differences in return rate between the two groups: what we call in the empirical section our treatment group (granted students) and our control group (not granted students).

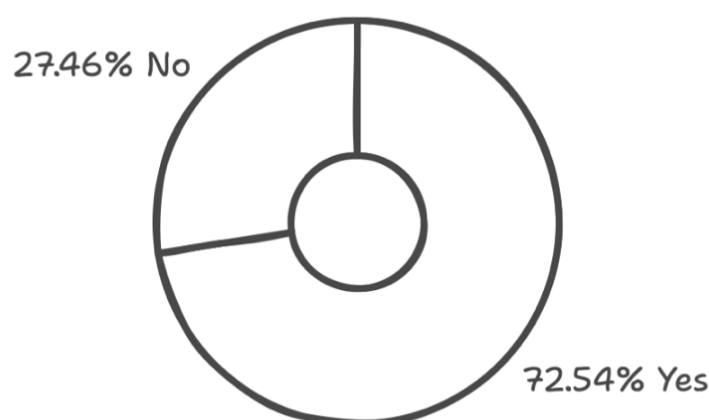
Table 3.9. Returnees (granted vs. not granted)

<i>Students having studied or studying abroad</i>		<i>of which “returnees”</i>	<i>of which answered “yes” to the “big question”</i>	<i>of which declared to return because of the scholarship penalty</i>
<i>Granted</i>	131	93.13%	67.97%	76.34%
<i>Not Granted</i>	230	55.22%	76.51%	

The return rate for not granted students is 55.22%, meaning that more than half returned or declared to return home after studies. On the other hand, it is noticeable that the return rate for granted students is remarkably high, shooting up to 93.13%. In other words, students in the control group (not granted) are likelier to stay abroad, while those who received the scholarship overwhelmingly return home.

Table 3.11 also shows other important intuitions about the effect of the scholarship penalty on the recipient’s decision to stay abroad or return. Note that 67.97% of the granted students answered “yes” to the “big question” that hypothesises an imaginary scenario in which a firm decides to hire the student and repay the scholarship plus interest (Figure 3.7 below) This suggests that decisions based purely on patriotic attitudes, as advanced above, are less likely. Moreover, 76.34% of returnees declared to return because of the scholarship scenario. These results support the hypothesis that the scholarship may act as a *push* factor.

Figure 3.7. Answer to the “big question”



However, one important question arises at this point: is the Ecuadorian scholarship a quasi-perfect instrument influencing students’ decisions to return home after studies, or is there any element of endogeneity in the composition of the treatment and control groups? The decision to stay abroad or return home in the second period may already be factored into the initial decision to apply for the scholarship in the first one (see Figure 1.1). Students with different characteristics, for example, age, family income, etc., could be more likely to apply for and be granted the scholarship. Remember that

the vast majority of students who applied for the scholarship were granted it. There is a risk of self-selection bias if these characteristics also influence the likelihood of returning home after studies, independent of the scholarship's effect. To address this issue, logit regression and propensity score matching consider observed differences and correct potential selection bias.

4. The empirical analysis

An econometric analysis is performed to investigate the hypotheses discussed in Session 2. The analysis focused on determining the factors influencing Ecuadorian students' decision to stay abroad after finishing their studies. It primarily examined the impact of being granted the Ecuadorian return-contingent scholarship on the likelihood of staying abroad. Due to the unavailability of ex-ante data, its effect was assessed using a counterfactual analysis. We used two methodologies for a more robust examination of the data: logit regression (LR)⁴³ and propensity score matching (PSM)⁴⁴. Both are well-suited for addressing specific challenges in causal inference and observational data analysis, mainly when dealing with issues like selection bias—in observable covariates—resulting from a possible non-random treatment assignment. Specifically, due to the binary nature of the dependent variable, we used LR to assess the hypothesis and estimate the relationship between the treatment (i.e. the scholarship) and the outcome (i.e. the likelihood of staying abroad after studies). We used PSM to confirm the findings regarding the scholarship's effect, benefiting from a different comparison process between treated and untreated groups. Additionally, because PSM is a semi-parametric method, it is less dependent on the assumption of a linear relationship, whereas, in LR, a parametric method, the log-odds of the outcome (for a binary outcome) are assumed to be a linear function of the covariates. While LR and PSM account for observable differences, they do not address unobservable factors. As a result, the ignorability assumption may still be violated, leading to potential residual selection bias. More details about both methodologies will be provided later.

Both methodologies used “stay abroad” as the dependent variable and, among the other independent variables, the treatment variable “scholarship”. As mentioned, the treatment group was composed of the students being granted, while the control group was composed of the students not being granted. “Stay abroad” is a dichotomic variable indicating whether the student chooses (or intends) to stay abroad after completing their studies, referring to the information in Tables 3.10 and 3.11 in Section 3.

As discussed above, 361 sample respondents were studying or had previously studied abroad. The remaining students studied or were studying in Ecuador, so they are not included in this analysis. Additionally, we did not consider those who had not yet decided at the moment of the survey. For this reason, we will use only 325 observations for the empirical analysis.

Before starting with the first methodology, the logit regression, we retake the anticipated potential problem of self-selection bias on observable factors influencing the composition of the treatment and control groups. This concern was raised because of the difference in return rates between granted and non-granted students and because only a tiny portion of the students who applied for the scholarship were not given it. As already said, the students' idiosyncratic characteristics risk driving this composition. To have a clearer idea of the possible differences between groups, Table 4.1 compares the means in terms of age, gender, family income and academic performance, of granted and not granted, as well as the students who applied and those who did not apply.

⁴³ Berkson (1944).

⁴⁴ Rosenbaum and Rubin (1983).

First, we can observe that scholarship recipients (mean age 37.31) are older than non-recipients (mean age 35.15), with a t-test value of 3.60, indicating a statistically significant difference. When we consider only students (excluding former students), the mean age values are lower, as expected: 36.5 for recipients and 34.24 for non-recipients, which confirms the previous findings. We only collect respondents' ages at the time of the questionnaire and not their ages when applying for scholarships. However, we know when students begin the studies abroad program and can assume they applied for the scholarship approximately a year prior to departure. This estimation allows us to compare the mean age of applicants (29.73) with non-applicants (27.95) at the estimated time of application. Similarly to the age difference between recipients and non-recipients, the t-test value of 3.05 indicates a statistically significant difference.

Gender distribution reveals a statistically significant difference between groups. Students who applied for the scholarship are more likely to be male (43%) compared to those who did not apply (57%), as reflected by a t-test value of 2.77. Among scholarship recipients, 41% were male compared to 56% in the non-recipient group, with a t-test value 2.99. This gender imbalance may reflect underlying disparities in access to scholarships or differences in motivations to apply for them.

Family income differences between the groups are relatively small but statistically significant. Students who applied for the scholarship reported slightly lower incomes (mean 2.78) than those who did not (2.93), with a t-test value of 2.06. Similarly, recipients had a slightly lower mean income (2.79) compared to non-recipients (2.91), although this difference is not as significant (t-test value of 1.50). This suggests that income may play a smaller role in scholarship application decisions but could still be a relevant factor.

Academic performance shows no significant difference between those who applied and those who did not (t-test value of -1.14), and between scholarship recipients and non-recipients (t-test value of -1.75). This suggests that academic performance may not have been a decisive factor in applying for or receiving the scholarship.

Table 4.1 Groups comparison

<i>Means</i>	<i>Apply</i>	<i>Not Apply</i>	<i>t-test</i>	<i>Granted</i>	<i>Not Granted</i>	<i>t-test</i>
<i>Age</i>	29.73	27.95	3.05	37.31	35.15	3.60
<i>Gender</i>	0.43	0.57	2.77	0.41	0.56	2.99
<i>Family income</i>	2.78	2.93	2.06	2.79	2.91	1.50
<i>Academic performance</i>	3.24	3.16	1.14	3.29	3.15	1.75

Logit regression and propensity score matching will account for the observed differences and correct for potential selection bias in observable factors.

4.1. Logit regression

We used a logit regression (LR) as a first method to investigate why Ecuadorian students chose to stay abroad after completing their studies. It may be helpful to recall that LR models the probability (p) of the outcome occurring as a function of one or more independent variables when the dependent variable is binary. It uses the logit function to model the log of the odds of the outcome (logit (p): $\log(\frac{p}{1-p})$) as a linear function independent of the variables $X_1 \dots X_N$. The LR equation can be written as: $\text{logit}(p) = \beta_0 + \beta_1 X_1 + \dots + \beta_n X_n$. It is straightforward to show that each exponentiated estimated coefficient (β) can be interpreted as an odds ratio, indicating how the odds of the outcome change

following a one-unit increase in the corresponding independent variable - for example, the presence versus absence of the scholarship in the context of this study. An exponentiated β value <1 suggests a reduction in the odds of the outcome (i.e., staying abroad), whereas a value >1 indicates an increase. Additionally, the marginal effects provide numerical estimates of how the probability of the outcome (p) changes when the independent variable increases by one unit.

The dependent variable was “stay abroad”, and the following independent variables were considered:

- “Age”, “gender”, “family income”, “academic performance”, and “English” knowledge to control for the heterogeneity of the students;
- “English-speaking country” to control for the destination countries, specifically the English-speaking ones, known for a high stay rate according to the literature (Van Bouwel, 2010; Felbermayr and Reczkowski, 2014; Van Bouwel and Veugelers, 2014);
- Homesickness variables (w.r.t. “country”, “family”, and “friends”), perceptions about the opportunities abroad (“career opportunities” and the knowledge of “other languages” besides English), and satisfaction with the study abroad experience (w.r.t. “studies program” and “university”) to test the hypotheses H1, H3 and H2, respectively;
- The binary variable “scholarship” (i.e., being granted the scholarship) to assess its impact as a *push* factor (H4), which constitutes the core variable of interest in this work;
- The interaction terms (w.r.t. “age”, “gender”, “family income”, and “academic performance”) to determine whether the scholarship’s effect on the likelihood of staying abroad varies across groups.

Results are presented in Table 4.2. Columns (1), (2), (3) and (4) report the non-exponentiated coefficients of the four different specifications of the logit model. Although the most important thing for this work is to focus on the significance and sign, columns (1a), (2a), and (3a) provide exponentiated (β) (thus odds ratios) as well as marginal effect (in parentheses) to help the reader gauge the magnitude of the effect of the independent variables on the propensity of individuals to stay abroad. Since regression (4) aims to verify the presence of an interaction and its sign, we do not report odds ratios and margins.

Regressions (1) and (1a) suggest that, for the analysed sample, receiving the scholarship negatively impacts the likelihood that a student stays abroad after studies. The finding aligns with our expectations and is statistically significant, suggesting that the scholarship serves as a *push* factor in Baruch’s terms. The estimated odds ratio is very low at 0.05, suggesting a strong reduction in the probability of staying abroad in the presence of a scholarship. The result is confirmed by the reported marginal effect of 0.38, i.e., a 38 percentage points decrease in the probability of staying abroad when respondents have opted/been granted the scholarship. The strength of this result was already anticipated in the descriptive statistical analysis in Section 3.

Regressions (2) and (2a) control for many potential confounding determinants of the decision to stay abroad (Age, Gender, Family income...), but still support the initial findings of the scholarship, considerably reducing the likelihood of staying abroad. The estimated odds ratio is even lower at 0.03, and the marginal effect of the scholarship is 0.39. Additionally, results show that knowing English and studying in an English-speaking country positively influence the likelihood of staying abroad. In particular, the expected difference in the probability of staying abroad associated with these variables is a 10 and 11 percentage points increase, respectively. The latter result aligns with the findings of the literature (Van Bouwel, 2010; Felbermayr and Reczkowski, 2014; Van Bouwel and Veugelers, 2014). Please, note that the number of observations decreased from 325 to 303 due to missing data for this variable, as some students opted not to disclose their age.

Table 4.2 Logit analysis of the determinants of the decision to return home vs stay abroad: results.

Dependent variable: <i>Stay Abroad</i>	(1)	(1a)	(2)	(2a)	(3)	(3a)	(4)
Scholarship	-2.87***	0.05*** (-0.38)	-3.35***	0.03*** (-0.39)	-3.09***	0.04*** (-0.30)	-6.19***
<i>Age</i>			-0.00	0.99	0.02	1.02	-0.01
<i>Gender</i>			0.33	1.40	0.35	1.43	0.44
<i>Family income</i>			0.18	1.20	0.09	1.10	-0.00
<i>Academic Performance</i>			0.01	1.01	-0.16	0.85	-0.21
<i>English</i>			0.97*	2.64* (0.11)	0.87	2.38	1.10*
<i>English-speaking country</i>			0.94**	2.56** (0.10)	0.51	1.67	0.59
<i>Other languages</i>					1.13***	3.10*** (0.13)	1.19***
<i>Career Opportunities</i>					0.60***	1.83*** (0.07)	0.61***
<i>Studies program</i>					-0.15	0.85	-0.13
<i>University</i>					-0.34	0.70	-0.40
<i>Homesickness (country)</i>					-0.53***	0.58*** (-0.06)	-0.59***
<i>Homesickness (family)</i>					0.02	1.02	0.07
<i>Homesickness (friends)</i>					0.74***	2.11*** (0.07)	0.73***
<i>Int. Scholarship*Age</i>							0.35***
<i>Int. Scholarship*Gender</i>							0.26
<i>Int. Scholarship*Ac. Performance</i>							2.22
<i>Int. Scholarship Family income</i>							1.91*
Constant	-0.54***	0.57	-2.30*	0.09	-3.95	0.01	-2.69
N. obs.	325	325	303	303	303	303	303
Pseudo R2	0.1653	0.1653	0.2207	0.2207	0.3337	0.3337	0.3723
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

*** significance at 1%; ** significance at 5%; * significance at 10%

Regression (3) and (3a) include the variables that reflect the conceptual model and the research hypotheses detailed in Section 2. They show that perceiving better career opportunities in the host country and knowing languages besides English- both influencing the perception of improved opportunities abroad- increases the likelihood of staying abroad. In particular, the expected difference in the probability of staying abroad associated with knowing other languages besides English is a 13 percentage points increase, and the average marginal effect on the probability associated with one unit difference in career opportunities perceptions is a 7 percentage points increase. Conversely, the results regarding students' satisfaction with their experience abroad (regarding university and study

programs) were statistically insignificant. Finally, the data partially supports the hypothesis that homesickness serves as a push factor influencing students to return home after completing their studies abroad. In particular, homesickness for one's home country significantly reduces (by 6 percentage points) the likelihood of staying abroad, aligning with the push factor argument. However, homesickness for family does not significantly influence post-study intentions, and surprisingly, homesickness for friends is associated with an increased likelihood of staying abroad. A potential reason could be that students expressing homesickness for friends might also possess effective coping strategies or have actively established a new social life overseas, thereby improving their overall adaptation and dedication to remaining.

At this stage, the hypotheses introduced earlier in this paper are somewhat supported. In particular, according to the results:

- Higher levels of homesickness for one's home country negatively influence the probability of staying in the host country. It acts as a *push* factor (H1 partially supported by the results).
- Higher host country's expectations of better opportunities positively impact the likelihood of staying in the host country. It acts as a *pull* factor (H3 supported by the results).
- The fact that one has been financed through a scholarship program like the Ecuadorian Scholarship negatively affects the probability of remaining in the host country. It acts as a *push* factor (H4 supported by the results).

In contrast to Baruch et al. (2007), no evidence was found relating to satisfaction levels with the study abroad experience (H2 not supported by the results).

To examine how the effect of the scholarship varies across groups, regression (4) includes interaction terms between the scholarship and age, gender, family income, and academic performance. The interaction with age was statistically significant, with a positive coefficient (0.35) indicating that the impact of receiving an Ecuadorian scholarship on staying abroad after studies is less pronounced for older students and, conversely, more pronounced for younger students. No significance was found for the interactions with academic performance and gender. More importantly, the interaction with family income was significant and positive (1.91), suggesting that, overall, the strongly negative effect of the scholarship on the probability of staying abroad is less pronounced for students with higher reported family income and, conversely, more pronounced for students from poorer families. This latter finding aligns with what standard economic theory would posit. As a financial incentive, the scholarship's penalty is likely to have a more substantial effect on students with fewer financial possibilities for whom repaying the scholarship is a significant decision. In contrast, students from higher-income families may be less financially constrained, so the financial incentive likely counts less in their decision.

4.2. Propensity score matching

We now turn to propensity score matching (PSM), which was applied to compare and validate previous results by estimating the effect of receiving the return-contingent scholarship on the likelihood of remaining abroad after completing studies.

It can be helpful to briefly clarify how propensity score matching (PSM) differs from logistic regression. While PSM begins with a parametric step—estimating the propensity score using logistic regression (i.e., the predicted probability that an individual (or unit) receives a particular treatment (e.g., a scholarship), given their observed characteristics (covariates)—it is ultimately a semi-parametric method. Unlike logistic regression, which relies on a specific functional form relating the outcome to covariates, PSM focuses on comparing treated and untreated units that have similar propensity scores.

The core idea is to pair each treated unit (e.g., a student who received the scholarship) with one or more untreated units that have comparable propensity scores, reflecting similarity in observed characteristics. Units that differ substantially in these characteristics are not matched, ensuring that comparisons are made between similar individuals. Additionally, PSM requires common support, meaning that there must be overlap in the propensity score distributions of treated and untreated groups. This overlap ensures that matched comparisons are valid and that the estimated treatment effects are based on comparable groups.

There are different ways of performing the matching based on the propensity score. We applied Nearest Neighbor Matching⁴⁵ (matching to the closest unit) and Kernel Matching⁴⁶ (matching with the Kernel function).

Nearest Neighbor Matching represents the simplest and most intuitive method of conducting matching, as it consists of matching each treated unit with that particular non-treated unit with the closest numerical propensity score. Therefore, the control group is represented by a single untreated unit. The selection of control units is usually carried out with repetition (or re-entry); therefore, it is possible to assign the same untreated unit to multiple treated units repeatedly. Consequently, the number of non-treated units used to estimate the effect of the policy may be lower than that of treated units. Once the matching is done, the policy's effect estimate is obtained from the average of the differences between the pairs of matched units. The effect estimated with “nearest neighbour” will therefore be the following:

$$\frac{1}{N^T} \sum (Y_i^T - Y_j^C)$$

where:

- N^T represents the number of treated units in the sample
- Y_i^T represents the outcome for treated unit i
- Y_j^C represents the outcome for the matched control unit(s) j

The limit of this method is that it is possible to match some treated units with non-treated units with a very distant propensity score, despite being the closest among those available.

On the other hand, Kernel matching is a particular matching procedure as all non-treated units are “matched” to each treated unit but weighted inversely proportional to the distance of their propensity score from that of the treated unit. The estimate of the effect is given by the following formula:

$$\frac{1}{N^T} \sum_{i \in T} (Y_i^T - \sum_{j \in C} w_{ij} Y_j^C)$$

where:

- N^T represents the number of treated units in the sample
- Y_i^T represents the outcome for treated unit i
- Y_j^C represents the outcome for the matched control unit(s) j
- w_{ij} represents the weight assigned to control unit j when matching to treated unit i (based on the distance between their propensity scores).

⁴⁵ Rosenbaum, P. R., and Rubin, D. B. (1985)

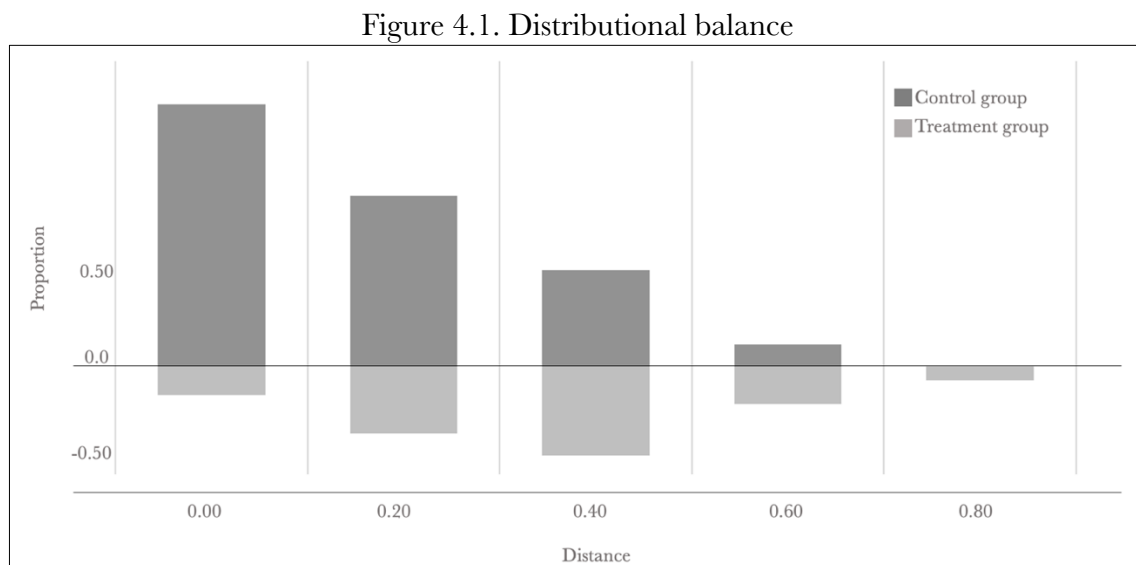
⁴⁶ Heckman, J. J., Ichimura, H., & Todd, P. E. (1997)

This type of matching, therefore, requires the choice of weights to be used so that the values decrease as the distance of the propensity score from that of the treated unit increases. Due to its complexity and analytical nature, we do not report the weight calculation formula, which is not important for the purposes of this work. Let us remember that the main advantage of this method is the fact that it uses all the available information, as both all the treated units and all the non-treated units are included in the estimate.

4.2.1 Analysis and results

The first step was to calculate the propensity score, which is the conditional probability that a unit is assigned to the treatment, given its observable characteristics prior to treatment, and regardless whether it was actually treated. A logistic regression was run relating the treatment (Ecuadorian scholarship), which becomes the dependent variable, with the explanatory variables of interest already utilised in the first regression method.

As said above, our treatment group consisted of students granted the scholarship (131 students) and the control group of those not granted (230 students). As shown in Figure 4.1, the balancing property was satisfied; common support exists for all levels except for a propensity score close to 1.



We then proceed to compute two estimations: the first using the Nearest Neighbor Matching method and the second using Kernel matching (Table 4.3). For both methods, we can see the number of treated and control units. The fourth column, ATT (Average Treatment Effect for the Treated), indicates the effect of the treatment (the scholarship) on the dependent variable (stay abroad). The standard errors and the t-test are reported in the fifth and sixth columns.

Table 4.3 Matching estimations

<i>Method</i>	<i>N treated</i>	<i>N controls</i>	<i>ATT</i> ⁴⁷	<i>Std. Err.</i>	<i>t</i>
<i>NN</i>	131	81	-0.246	0.069	-3.547
<i>Kernel</i>	131	229	-0.287	0.053	-5.423

⁴⁷ Average Treatment Effect for the Treated

As we can observe from the results of both matching methodologies, the estimated effects of the scholarship on the probability of staying abroad after studies are statistically significant. For the Nearest Neighbor Matching method, the Average Treatment Effect on the Treated (ATT) is -0.246, with a t-statistic of -3.547, indicating a highly significant result. Similarly, for the Kernel Matching method, the ATT is -0.287, with a t-statistic of -5.423, again showing strong statistical significance. The negative ATT values suggest that receiving the Ecuadorian scholarship reduces the likelihood of staying abroad after studies. These findings confirm the results from the earlier logistic regression. The negative sign of the ATT further supports the notion that students who receive the scholarship are less likely to stay abroad than those who do not, controlling for observable characteristics. These results confirm Hypothesis 4 (the scholarship acts as a *push* factor in Baruch's terms).

Matching has addressed the issue of observable variables in a manner that the treatment effect is estimated by comparing students with similar covariate profiles. The matching process corrects for the differences in terms of explanatory variables, implying that any remaining variations in the outcome (the likelihood of staying abroad) are more likely to reflect the actual effect of the scholarship rather than being driven by these differences.

However, it is essential to emphasise that while propensity score matching, like logit regression, accounts for observable differences, it does not address potential unobservable factors; therefore, the ignorability assumption may still be violated. If there are unobservable characteristics that affect both the likelihood of receiving the scholarship and the decision to stay abroad that are not included in the analysis, residual selection bias may still exist. Consequently, despite the findings clearly showing how the scholarship behaves as a *push* factor, the extent of its effect on students' decision to remain overseas should be interpreted cautiously, and further research is warranted to capture unobservable factors.

Conclusions

Based on a survey, this paper examined the factors influencing Ecuadorian students' decisions to stay abroad after completing their studies. Building on existing literature (Baruch et al., 2007), the study proposed a new hypothesis that the Ecuadorian government's scholarship program, which imposes a penalty on students who do not return home, may serve as a *push* factor.

The conceptual model outlined the hypotheses to be tested and provided a framework for the empirical analysis to identify factors that may either push or pull Ecuadorian students to stay abroad after their studies. Among these factors, the *push* impact of being financed by the Ecuadorian return-contingent scholarship was of particular interest. Two methodologies—logit regression and propensity score matching—were used to assess the effect of scholarship while accounting for confounding factors and mitigating potential self-selection bias arising from compositional differences between the treated and control groups, which could indicate endogeneity issues. The results partially confirmed the initial research-defined hypotheses. In particular, the perception of improved opportunities abroad was identified as *pull* factor, while homesickness for one's home country and being financed through the Ecuadorian return-contingent scholarship were identified as *push* factors in Baruch's terms. Conversely, no evidence about satisfaction levels with the study abroad experience was found.

Let us focus on the scholarship's *push* effect, which was the primary interest of this work. The descriptive analysis of the sample revealed a high return rate (93.13%) for students granted the scholarship, closely matching the rate reported by Ecuadorian authorities (90%). The differences in return rates between the recipients and not recipients (93.13% vs. 55.22%), as well as the fact that

only a small percentage of not recipients applied for the scholarship (14.78%), raised concerns about possible self-selection bias and an endogenous composition of treatment and control groups.

As we said, logit regression and propensity score matching were used to assess the scholarship effect while mitigating a possible self-selection bias that may exist in the composition of the treated and control groups that may be reflecting a potential endogeneity problem. Both methodologies confirmed that receiving the scholarship decreases the likelihood of staying abroad. The extent is substantial: -0.287 was the effect by Kernel estimations, suggesting that the scholarship acts as a *push* factor in Baruch's terms. Although both methodologies account for observed differences and help correct potential selection bias, there remains a risk of bias from unobserved factors—such as patriotism, motivation, personal goals, or family pressures—that may influence the decision. In other words, the ignorability assumption may still be violated. Further research is needed to address these unmeasured confounding factors. However, although we prefer not to overstate the extent of the effect due to the concerns mentioned above, what is true is that our findings, combined with the existing institutional data, show that the scholarship design contributes to an increase in the proportion of scholarship recipients returning to the country, serving efforts to combat brain drain, a primary concern for Ecuador. Moreover, our results are further supported by the heterogeneity of the policy effect: the scholarship has a stronger influence on return decisions among students with lower declared family income. This pattern aligns with the expected behaviour in response to a financial incentive: students from less wealthy backgrounds are more sensitive to monetary support and therefore more likely to be influenced by it when making long-term decisions.

A tentative conclusion for policymakers is that the findings in this chapter support the effectiveness of a return-contingent scholarship in influencing students' decisions, particularly in encouraging return migration. These types of financial incentives appear to be successful in shaping behaviour among recipients overall. However, their influence seems to diminish among higher-income individuals, who may have greater personal or financial flexibility to forgo the return requirements or absorb the repayment cost. This suggests that while a return-contingent scholarship can be a useful tool for mitigating brain drain and promoting the reintegration of skilled graduates into the home country, it may be less effective in achieving this goal across all socioeconomic groups.

As shown in the analysis, for a given family income level, an increase in income family levels decreases the effect of the scholarship on the likelihood of staying abroad; conversely, the effect is more substantial for students belonging to lower-income families. Furthermore, additional insights into the effect of the scholarship penalty on students' decisions to stay abroad reinforce our findings. The majority of scholarship recipients answered “yes” to the “big question”—a hypothetical scenario in which a company offers to hire the student and repay the scholarship, plus interest. This suggests that decisions based purely on patriotic attitudes are less likely. Moreover, many returnees declared that they returned because of the scholarship penalty. All these findings support the hypothesis that the scholarship acts as a *push* factor.

Nonetheless, the tool's design and our data raise fairness and efficiency concerns. On the one hand, some students choose not to apply due to lacking a guarantor, which may exclude certain financial backgrounds and limit qualified applicants. On the other hand, a significant portion of students who have studied abroad did not apply for the scholarship because of the penalty, probably anticipating the possibility of staying abroad. Therefore, the net number of students returning home is ambiguous a priori. The Ecuadorian government should then carefully evaluate the potential consequences of these penalties on the number of applicants, particularly among specific categories of students. Those who anticipate the possibility of staying abroad after their studies may hesitate to apply for this scholarship due to the fear of incurring penalties. Consequently, the net number of students returning home may be lower than it would be with a smaller penalty. By balancing incentives and disincentives,

the government can combat brain drain, enabling students to pursue higher education and acquire valuable skills.

On this issue, our data provide initial insights but lack enough information for a rigorous assessment. A comprehensive approach is needed, collecting data from those discouraged from applying. This would require surveying individuals who never entered the application process and targeting a broader group of prospective students. Therefore, this study does not provide conclusive evidence regarding the fairness and efficiency of the Ecuadorian scholarship program. Further research is necessary to achieve a comprehensive understanding of these dynamics. Moreover, conducting studies that provide ex-ante data may allow for applying methodologies beyond counterfactual approaches. Finally, investigating alternative policies incentivising individuals to return to their home country after studying abroad could yield valuable insights.

Nevertheless, these findings hold significant implications for higher education, not only in developing countries but also in developed nations implementing scholarships often based on a country-of-origin principle. In these latter countries, policies often fund students more likely to remain abroad after their studies, particularly in English-speaking countries, where the stay rates are high. This presents a concern for policymakers that these findings can help address, at least for less wealthy categories.

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Annexe

Table 3.3. Students' current situation

<i>Current situation</i>	<i>Freq.</i>	<i>Percent</i>
<i>a) Studying in Ecuador</i>	50	10.73
<i>b) Studying abroad</i>	155	33.26
<i>c) Working</i>	204	43.78
<i>d) Looking for a job</i>	57	12.23

Table 3.4. Degree Programme

<i>Degree</i>	<i>Percent</i>
<i>Bachelor</i>	6.74
<i>Master</i>	59.35
<i>PhD</i>	32.83
<i>Other</i>	2.17

Table 3.5. Field of studies

<i>Field of studies</i>	<i>Percent</i>
<i>Arts and Humanities</i>	3.45
<i>Communication</i>	1.94
<i>Economics and Management</i>	17.67
<i>Education</i>	4.31
<i>Engineering</i>	24.14
<i>Environmental Sciences</i>	8.19
<i>Health Sciences</i>	13.15
<i>Life Sciences</i>	4.09
<i>Psychology</i>	5.60
<i>Sciences</i>	6.47
<i>Social Sciences</i>	9.70
<i>Other</i>	1.29

Table 3.6. Continent of studies

<i>Continent</i>	<i>Percent</i>
<i>America-North</i>	5.56
<i>America-South</i>	22.23
<i>Asia</i>	1.65
<i>Europe</i>	66.39
<i>Oceania</i>	4.17

Table 3.7. Country of studies

<i>Country</i>	<i>Percent</i>
<i>Spain</i>	23.89
<i>Brazil</i>	8.33
<i>Belgium</i>	8.06
<i>UK</i>	7.50
<i>France</i>	6.67
<i>Germany</i>	5.83
<i>Mexico</i>	4.72
<i>Australia</i>	4.17
<i>US</i>	3.33
<i>Canada</i>	2.22
<i>Chile</i>	2.22
<i>Russia</i>	2.22
<i>Netherlands</i>	2.22
<i>Switzerland</i>	2.22

Table 3.8. Ecuadorian Scholarship

	<i>Number of students</i>	<i>Percent</i>
<i>Studying or studied abroad</i>	361	100
<i>Granted</i>	131	36.29
<i>Not granted</i>	230	63.71
<i>(of which applied)</i>	(34)	(14.78)

Table 3.9 “Perceptions and Homesickness” variables

<i>Variable</i>	<i>Obs.</i>	<i>Mean</i>	<i>Std. Dev</i>	<i>Min</i>	<i>Max</i>
<i>SL Professors</i>	361	4.23	0.96	1	5
<i>SL Studies Program</i>	361	4.13	0.94	1	5
<i>SL Peers</i>	361	4.08	0.98	1	5
<i>SL Country Economic Situation</i>	361	3.77	1.14	1	5
<i>SL Country Job Opportunities</i>	361	3.89	1.03	1	5
<i>SL Country Career Opportunities</i>	361	3.31	1.25	1	5
<i>SL Country Politic Situation</i>	361	3.45	1.22	1	5
<i>SL Country Quality of Life</i>	361	3.42	1.18	1	5
<i>SL Country Language</i>	361	4.01	1.05	1	5
<i>SL Country Culture</i>	361	4.11	1.06	1	5
<i>SL Country Weather</i>	361	4.06	1.06	1	5
<i>SL Country Food</i>	361	3.58	1.21	1	5
<i>Homesickness Family</i>	361	3.59	1.27	1	5
<i>Homesickness Friends</i>	361	3.87	1.09	1	5
<i>Homesickness Country</i>	361	3.36	1.14	1	5

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Appendix

Table 1. Stay rates in OECD countries

Australia	16% of all international students eventually transitioned to permanent residence.
Austria	Master's graduates 2016/17 who had left the country ("Wegzugsquoten"): Austrian nationals: 5%; German nationals: 64%; other EU: 53%; other non-EU (includes UK): 43%.
Belgium	43% had an active labour market status in Belgium (working or job seeking) in 2014.
Canada	43% of international students whose study permit had expired in 2017 obtained a post-graduation work permit within one year. This share was 48% for the 2012 cohort five years after their first study permit had expired.
Czech Republic	45% of the graduates of full-degree programmes have been staying in the Czech Republic for work purposes.
Denmark	42% of graduates from English-language programmes at Master level left Denmark within 2 years of completing their studies. Only about a third remain in the Danish workforce after 2 years.
Estonia	Graduates with master or doctoral degree who worked immediately after graduation; 56% in 2016/17; 58% in 2017/18.
Finland	67% of bachelor's, 64% of master's graduates were residing in Finland three years after graduation. Sample excludes those who lived in Finland before enrolment.
France	One year after first permit, 37% had left France (or became nationals); 5 years after first permit, 57% had left (or became nationals).
Germany	In October 2014, 54% of the former students were still living in Germany.
Korea	12% of master's and PhD graduates worked immediately after graduation in 2021.
Luxembourg	46% of international master and PhD graduates of 2014-19 had a first registered employment in Luxembourg.
Netherlands	Almost 25% of the international students who studied in the Netherlands still live there 5 years after graduating.
Norway	78% of international graduates of 2007 were still living in Norway five years after graduation – 88% among these were in employment. 76% of international graduates of 2012 were still living in Norway in 2017, 85% of these were employed.
New Zealand	Two-thirds (66%) of all first student permit (FSV) holders in 2009 are overseas five years after they obtain their FSV.
Switzerland	36% of international students (bachelor graduates of a university of applied sciences, graduates of a pedagogical university as well as master and PhD graduates) were residing abroad in 2015.
United Kingdom	Five years after graduation of the graduation cohort of 2013-14, about 39% of EU and 15% of non-EU graduates were recorded in "sustained employment", further studies, or both.

Source: OECD (2022) on different sources and authors' own elaboration

Table 2. Portability of student support (2023)

Portability of student support	Countries	Grants	Loans
Full portability across the European Higher Education Area (EHEA) of all available domestic student support measures – grants and/or loans – for credit and degree mobility Equivalent requirements for public grants and/or loans if students study in the home country or abroad	Iceland	No public grants	Portable for credit as well as degree mobility
	Norway	Portable for credit as well as degree mobility	Portable for credit as well as degree mobility
	Sweden	Portable for credit as well as degree mobility	Portable for credit as well as degree mobility
	Finland	Portable for credit as well as degree mobility	Portable for credit as well as degree mobility
	Netherlands	Portable for credit as well as degree mobility	Portable for credit as well as degree mobility
	Switzerland	Portable for credit as well as degree mobility	Portable for credit as well as degree mobility, but few students (less than 1%) take loans
	Slovenia	Portable for credit as well as degree mobility	No publicly subsidised loans
	Cyprus	Portable for credit as well as degree mobility	portable for credit as well as degree mobility
	Montenegro	Portable for credit as well as degree mobility	portable for credit as well as degree mobility
	Luxembourg	Portable for credit as well as degree mobility	portable for credit as well as degree mobility
	Belgium_nl	Portable for credit as well as degree mobility	No publicly subsidised loans
Portability of available domestic student support measures – grants and/or loans – for credit and degree mobility, but with some restrictions related to geography (country limitations), and/or types of program, and/or field of study or time	Belgium_fr	Portable for credit as well as degree mobility, but with some restrictions (within the EU) Outside the EU, portable only if there is no comparable programme in the home system	That were little used have been abolished in favor of study grants
	Ireland	Yes, but with some restrictions	No publicly subsidised loans
	France	Yes, but with some restrictions	portable only for credit mobility (not counted in the indicator since the proportion of loan beneficiaries is very low, below 1%).
	Denmark	Yes, but with some restrictions	Yes, but with some restrictions
	Germany	Combined grant/loan system with portability for credit as well as degree mobility, but with some restrictions	
	Austria	Yes, but with some restrictions	No publicly subsidised loans
	Estonia	The main grant schemes (need-based study allowance and scholarships for students with special needs) are fully portable; portability of merit-based grants and stipends for studying in specific (priority) fields is limited to credit mobility	Portable for credit as well as degree mobility
	Malta	Yes	No publicly subsidised loans

Portability for credit mobility, without restrictions No portability for degree mobility OR not all major support measures are portable for degree mobility.	Poland	Portable only for credit mobility	Portable only for credit mobility, but rarely used (by less than 1% of students)
	Czech Republic	Portable only for credit mobility	No publicly subsidized loans
	Slovakia	Portable only for credit mobility	Portable for credit as well as degree mobility, but rarely used (by less than 1% of students)
	Hungary	Portable only for credit mobility	Portable for credit as well as degree mobility, but with some restrictions
	Croatia	Portable only for credit mobility	There are no publicly subsidized loans
	Italy	Portable only for credit mobility	Portable only for credit mobility, but rarely used (by less than 1% of students)
	Turkey	Portable only for credit mobility	Portable for credit as well as degree mobility, but with some restrictions
Portability for credit mobility but with some restrictions related to geography (country limitations), and/or types of programs, and/or field of study or time No portability for degree mobility OR not all major support measures are portable for degree mobility	Spain	Portable only for credit mobility and with some restrictions	No publicly subsidized loans
	Portugal	Portable only for credit mobility and with some restrictions	Portable only for credit mobility, but rarely used (by less than 1% of students)
	Latvia	Portable only for credit mobility and with some restrictions	Portable only for credit mobility
	Lithuania	Portable only for credit mobility and with some restrictions	Portable only for credit mobility and with some restrictions
	Romania	Portable only for credit mobility and with some restrictions	No publicly subsidized loans
No portability: public grants and/or loans are only provided if students study in the home country or in exceptional cases (no equivalent program is available in the home country).	Bosnia and Herzegovina	There are public grants, but they are not portable	No publicly subsidized loans
	Serbia	There are public grants, but they are not portable	There are publicly subsidized loans, but they are not portable
	North Macedonia	There are public grants, but they are not portable	No publicly subsidized loans
	Albania	There are public grants, but they are not portable	No publicly subsidized loans
	Bulgaria	There are public grants, but they are not portable	There are publicly subsidized loans, but rarely used (by less than 1% of students) Loans are not portable
	Greece	Portable only for credit mobility and with some restrictions Grants are rare (less than 1% of students receive grants)	No publicly subsidized loans in the first cycle For second cycle studies, the legal basis for publicly subsidized loans has been established but it is not applied

Source: Eurydice and authors' own elaboration.