Domestic Determinants for Attracting International Students

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ABSTRACT

Objective: This study aims to measure the attractiveness of a group of countries over international students and identify the main determinants of attractiveness. **Methodology**: Based on data from G20 countries, Europe and Asia provided by United Nations Educational, Scientific and Cultural Organization (UNESCO), between 2009 and 2018, a gravity equation was estimated using the Poisson Pseudo-Maximum Likelihood (PPML) technique. **Results**: The results of the work indicated that: i) countries with a high Human Development Index (HDI), with attraction policies and English-speaking countries are the main destinations for immigrant-students; ii) countries with an inclusive higher education system, with an attraction policy or with similar relations, colonies and languages are regional centers of attraction for international students and iii) socio-educational inclusion, the existence of an attraction policy and the reputation of the national higher education system are the main components of the student attraction force exerted by countries. The analysis of a gravity equation estimated by the Poisson Pseudo-Maximum Likelihood (PPML) technique makes possible to identify the main components of the forces that attract international students to national higher education systems. **Conclusion**: In addition, the analysis helps researchers and managers, who now have new information on internationalization of higher education, in decision making on the subject.

KEYWORDS

International students. Attractiveness. Determinants. G20.

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Determinantes Domésticos para Atração de Estudantes Internacionais

RESUMO

Objetivos: Este estudo objetiva mensurar o poder de atratividade de um grupo de países sobre os estudantes internacionais e identificar os principais determinantes da atratividade. Métodos: A partir dos dados de países do G20, Europa e Ásia, disponibilizados pela Organização das Nações Unidas para a Educação, a Ciência e a Cultura (UNESCO), entre os anos de 2009 e 2018, foi estimada uma equação de gravidade por meio da técnica Poisson Pseudo-Maximum Likelihood (PPML). **Resultado**: Os resultados do trabalho indicaram que: i) países com alto Índice de Desenvolvimento Humano (IDH), anglófonos e com políticas de atração são os principais destinos de imigrantes-estudantes; ii) países com sistema de educação superior inclusivo, com uma política de atração ou com relações, colônias e idiomas semelhantes, são centros regionais de atração de estudantes internacionais, e iii) inclusão socioeducacional, existência de política de atração e reputação do sistema nacional de educação superior são os componentes fundamentais da força de atração de estudantes exercidas pelos países. A análise de uma equação de gravidade, estimada pela técnica PPML, permite identificar os principais componentes das forças de atração de estudantes internacionais para os sistemas nacionais de educação superior. **Conclusão**: Além disso, a análise auxilia pesquisadores e gestores, que passam a contar com novas informações sobre internacionalização do ensino superior, na tomada de decisão sobre o tema.

PALAVRAS-CHAVE

Estudantes internacionais. Atração. Determinantes. G20.

Determinantes Domésticos para Atraer Estudiantes Internacionales

RESUMEN

Objetivos: Este estudio tiene como objetivo medir el atractivo de un grupo de países sobre los estudiantes internacionales e identificar los principales determinantes del atractivo. **Metodología**: A partir de datos de países del G20, Europa y Asia proporcionados por Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura (UNESCO), entre 2009 y 2018 se estimó una ecuación de gravedad utilizando la técnica de Poisson Pseudo-Maximum Likelihood (PPML). **Resultados**: Los resultados del trabajo indicaron que: i) los países con un Índice de Desarrollo Humano (IDH) alto, con políticas de atracción y los países de habla inglesa son los principales destinos de los inmigrantes-estudiantes; ii) países con un sistema de educación superior inclusivo, con política de atracción o con relaciones, colonias y idiomas similares, son centros regionales de atracción de estudiantes internacionales, y iii) inclusión socioeducativa, la existencia de una política de atracción y la reputación del sistema nacional de educación superior son los principales componentes de la fuerza de atracción de estudiantes que ejercen los países. El análisis de una ecuación de gravedad estimada por la técnica PPML permite identificar los principales componentes de las fuerzas de atracción de estudiantes internacionales a los sistemas nacionales de educación superior. **Conclusión**: Además, el análisis ayuda a los investigadores y gestores, que ahora cuentan con nueva información sobre la internacionalización de la educación superior, en la toma de decisiones sobre el tema.

PALABRAS CLAVE

Estudiantes internacionales. Atracción. Determinantes. G20.

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Introduction

As a consequence of the emergence of a knowledge-based global economy, the use of new technologies, and the increasing massification of higher education, international student mobility has become an important topic in discussions about higher education and migration policies (FRANCE; ALVES; PADILLA, 2018). Among the various categories of migrants, international students experience the fastest increase in relative terms (BEINE; NOËL; RAGOT, 2014). Between the years 2009 and 2018, international student enrollments increased from 3,538,560 to 5,571,402, showing an increase of 57.45%. The total number of migrants increased by 3.3% between the years 2000 and 2015, from 173,000,000 to 244,000,000 people, approximately (IMO, 2018).

Migration of people faces political, economic, and cultural barriers, which is not the case with student migration because students are seen as an opportunity for funding the national higher education system, as potential substitutes for skill absence, engendering improved soft power of the countries receiving the students (CZAIKA; PARSONS, 2017; HAWTHORNE, 2018; NYE, 2004).

Due to their status as desirable migrants, students do not face major mobility restrictions regarding their origin (HAWTHORNE, 2018). Most of them come from the Asian continent. According to data from the United Nations Educational, Scientific and Cultural Organization (UNESCO), in 2018, the West Asia, Pacific, and South Asia regions were the regions of origin for 1,952,189 international students, which accounted for 51% of the total. Next comes North America and Western Europe, with 703,456 students sent to other countries. Another group that stands out is where students who have no national ties, stateless people 257,413 students, 6.22% of international students (UNESCO, 2018). Although the majority of students originate from the West Asia-Pacific, South Asia, and North America-West Europe regions, 1,497,426 originate from other regions of the globe.

Regarding the regions that international students go to, there is a strong demand for studying in countries with greater political, economic, and military influence. The regions with the greatest attractiveness of international students are North America and Western Europe, with 2,876,890, and West-Asia and Pacific, with 1,197,087 (UNESCO, 2018). The available data show that the direction of the flow of international migration that, until the 1990s of the 20th century, was predominantly South-North, now has an additional vector, towards West Asia and the countries of the Pacific Ocean (CASTLES; MILLER, 2009), which is also the case for the migration of international students. The two regions account for 73.12% of international student enrollment.

Between 2009 and 2018, the -East Asia and Pacific region had an increase of 1 percentage point of enrolled students and the North America and Western Europe regions a decrease of 4 percentage points. These events can be explained by the slowdown in outbound shipments of Chinese students and the increased attractiveness of the Chinese higher education system. The fact is that China has become a major player in the academic world

environment, as it already is in other areas of world geopolitics (WU, 2019).

The following aspects can enhance a country's strength of attractiveness over international students: whether there are government actions that facilitate the entry of foreign students (BECKER; KOLSTER, 2012), the distance between origin and destination (BEINE; NOËL; RAGOT, 2014; CZAIKA, 2018), the quality of life of the destination (TIGAU; BOLAÑOS GUERRA, 2015), colonial connections (DE GENOVA, 2010; FRANCE; ALVES; PADILLA, 2018), and English-speaking countries having greater attractiveness compared to those with other languages (BARNETT *et al.* , 2016).

Interestingly, the combination of incentive policies, including tuition waivers, with scholarships for international students has enabled a governance model that seeks legitimacy related to a 'welfare' logic (LUNDIN; GESCHWIND; LUNDIN, 2021). Such facts highlight that international student attraction factors are not limited to economic and political aspects, cultural, historical, and academic aspects, too, can be determinants for a country to attract more students to its higher education system (BEINE; NOËL; RAGOT, 2014; KRITZ; GURAK, 2018).

From this perspective, the objective of this article is to measure the power of attractiveness of a group of countries for international students and to identify the main determinants of this attractiveness. In addition to the countries that belong to the G20, the countries of the European Union and Asia were also analyzed, because although they are not in the international body, they are among the top 30 destinations of migration of international students. A gravity equation was used, which has as a dependent variable the number of international students enrolled in the higher education systems of the countries in the sample. In turn, the explanatory variables come from four dimensions that reflect key drivers: social/cultural, political, academic, and economic. Along these lines, the determinants of international student attractiveness are political-specific actions to attract students, publicity about quality of life (soft power); academic - universities ranked among the best in the world in ranking portals, and the possibility of taking courses in the English language; economic - human development index; and cultural, such as colonial heritage and/or cultural ties between the countries of origin and destination. The aforementioned gravity equation was estimated using the Poisson Pseudo-Maximum Likelihood (PPML) method.

This paper consists of six sections. In the introductory section, there is a contextualization of the origin and destination of migrants who want higher education, the main drivers of attractiveness, the objectives of the study, and the presentation of the cases that make up the sample. In the following sections: we resort to the literature to search for the reasons why some countries want to increase their stocks of international students (second); a review of empirical studies that use gravity models to investigate the determinants of international student demand (third); we describe the methods used to obtain, present and discuss the data (fourth); we present the analysis and discussion of the results of the study (fifth). In the final section, the conclusions obtained from the research, the limitations, the contribution to the area of study, and suggestions for future work are listed.

The Reasons and Determinants for Attracting International Students

The attraction of international students is part of a set of academic actions aimed at the internationalization of education. The definition of this phenomenon is not a consensus in the literature and, in this work, we adopt the concept that internationalization at the national, sector, and institutional level is "the process of integrating an international, intercultural or global dimension into the purpose, functions or delivery of postsecondary education" and the spatial dimension where internationalization activities can take place is either external to the campus or internal to the campus (KNIGHT, 2005, p. 17). To that extent, the attraction of international students aims to offer people of different nationalities, without distinction of culture, religion, or race, tertiary, scientific, or technical educational training within or outside the headquarters of the educational institution (SIN; ANTONOWICZ; WIERS-JENSSEN, 2019).

However, the internationalization of higher education is not limited to the academic space. The training of people and the production of scientific knowledge are parameters that can increase the competitiveness of companies and countries in a scenario where economic, social, and cultural relations are influenced by globalization (CHANKSELIANI, 2018; EUROPEAN MIGRATION NETWORK, 2012; OECD, 2016). Thus, the occupation of seats in higher education institutions by students coming from other countries is on the agenda of several governments, for the following reasons:

a) Political: attracting students from a certain region can improve the image of the receiving country to the population of the student's home country, as well as promote the training of students with the potential to lead aligned countries or destabilize non-aligned governments (CHANKSELIANI, 2018; KNIGHT; DE WIT, 1995);
b) Economic: complement the funding of the higher education system, train people for areas where there are shortages in the local labor market, and contribute to the national balance of payments (CZAIKA; PARSONS, 2017; SIN; ANTONOWICZ; WIERS-JENSSEN, 2019);
c) Social/Cultural: promote intercultural experience among students and teachers, perform transnational teaching-learning activities, and provide students with opportunities for work, cultural and entertainment activities to complement the formation of the global citizen (KNIGHT, 2012; SEEBER *et al*., 2016);
d) Academic: offer training that allows students to perform their professional activity in various regions of the globe and diverse cultural, economic, and political environments, in addition to contributing to the development of less developed higher education systems and promoting teaching and scientific partnerships that enable the participation of students (CORYELL *et al*., 2010; KNIGHT, 2015).

To transform policy agenda items into more international students enrolled, it is

necessary to adopt instruments that make the higher education system attractive and facilitate the application, transit, and adaptation processes of the student-migrant in the destination country. These instruments are: granting scholarships to young people from poor countries or potential country leaders in strategic regions (LAIFER; KITCHEN, 2017; LOMER, 2017; MKHOYAN, 2017); waiving or facilitating the granting of visas for students, imposing equal treatment between domestic and foreign students concerning academic fees (BECKER; KOLSTER, 2012; FRANCE, 2019); subsidies for transportation, housing and food and access to the national health system (France, 2019; Sin et al, 2019; Barnett et al., 2016); programs for entering the labor market after graduation; aid for the cost of commuting (air, land or sea passage) (BEINE; NOËL; RAGOT, 2014) and academic fees; and offering a labor market with the potential for student retention (HAWTHORNE, 2018; OECD, 2016; SUTER; JANDL, 2008).

It is worth mentioning that social/cultural determinants, such as colonial heritage, English as the dominant language in academia, the notion of the level of safety (TIGAU; BOLAÑOS GUERRA, 2015), and cultural and ethnic diversity (CUBILLO; SÁNCHEZ; CERVIÑO, 2006; ROUHANI, 2007), facilitate the student's adaptation process in the destination country. This is because the more comfortable the student feels with the language and culture, or the more he or she has access to support networks, the less the environment will seem hostile.

Higher education institutions contribute to the reputation achieved in the various university ranking portals and offer international curricula for the courses taught, internship programs, foreign language course offerings (mainly in English), and differentiated competition for international students' admission (BARNETT *et al.,* 2016; BECKER; KOLSTER, 2012; CHANKSELIANI, 2018; KRITZ; GURAK, 2018).

The analysis of the determinants of international student attractiveness strength has been done, empirically, by applying various estimation methods (Table 1). More modern techniques suitable to the topic have been incorporated as these have evolved (VIEIRA et al., 2019).

Frame 1. Contributions of the literature that analyzed the migration of international students

Authors	Objective	Data Analysis Method	Results
Barnett et al. (2016)	The paper provides a network analysis of the international flow of students between 210 countries and the factors that determine the structure of that flow.	Quadratic Evaluation Procedures.	The results are discussed in the light of world-system theory. The determinants of communication, distance, and cultural connections are the most important in the flow structure.
Kazemi et al. (2018)	This study aimed to explore why Iranian students emigrate to Malaysia and what are the most common	Likert Scale and Chi-square test.	The results provided evidence that the immigration of Iranian students to Malaysia is

	causes of migration growth that accompanied this trend.		strongly related to perceived freedom in the areas of politics, social norms, speech, religion, press, and the reputation of Malaysian universities.
Efendi et al. (2020)	This research aimed to identify the prevalence of Indonesian nursing students intending to work in Japan and the predictors of their intention to migrate, as well as having a definite plan to work in Japan.	Descriptive Analysis and Multiple Logistic Regression Analysis.	Factors associated with having the intention to migrate were age, residence, and experience abroad. Other factors related to a plan to work abroad were: family income, command of a foreign language, and bilateral agreement on labor migration.
Wang (2020)	This study investigates the extent to which social capital influences the English fluency of international students in Ireland and how language skills affect their earnings in the Irish labor market after graduation.	Ordinary Least Squares.	The main findings suggest that: (1) Building a social capital bridge with the Irish has a significant positive effect on international students' English fluency. (2) English fluency, social capital bond with co-nationals, as well as a social capital bridge with Irish all have positive effects on graduates' monthly salary.
Guru et al. (2021)	This article attempts to classify the determinants that shape Indian students' decisions in selecting an appropriate global destination.	Exploratory Factor Analysis and Fuzzy Hierarchical Analytic Process.	The results showed that student-oriented beliefs relate, positively, to teachers' participation in continuing professional development.
Marks et al. (2018)	The purpose of this study is to examine indicators of study-abroad participation and international student enrollment to understand the determinants driving the critical components of campus internationalization.	Correlation Test and Ordinary Least Squares.	The results suggest that the combination of socioeconomic status and the cost is an important factor in international mobility participation rates. In addition, the analysis confirms that the gender balance across campuses influences participation rates. Specifically, campuses with higher observed female enrollment rates have higher study-abroad participation.

Badri et al. (2017)	The goal of this study is to use statistical evidence to better understand the impact of professional development and its causal determinants.	Exploratory Factor Analysis and Structural Equation.	The results show that perceived needs, feedback evaluation, and teacher beliefs do not significantly affect the perceived impact on professional development. Teacher categories (gender and age) and school categories (public or private) had significant effects on teacher attitudes toward most constructs of professional development in a multicultural environment.

Source: Elaborated by the authors.

Regarding the variables used in the models, Kazemi *et al*. (2018) point out that the concern about the immigration issue continues to grow and legislators, politicians, community leaders, policymakers, and academics face many challenges in understanding what factors attract or hinder the path of students who decide to leave their countries to obtain an academic degree in another country. The authors identified that the main factors attracting Iranian students to Malaysia are: higher wages; a greater sense of freedom; knowledge being valued; an opportunity to live with mental and emotional peace; more hopes for the future; freedom of choice regarding clothing, gender equality, job security, and cultural and social freedom; in a short, higher standard of living and higher social status. In turn, repulsion factors are linked to limited civil rights, poor structure in academia, and job insecurity.

Barnett *et al.* (2016) performed associations between seven key factors (student flows, common border, physical distance, languages, communication, hyperlinks, and trade) to identify the determinants of international student attractiveness. Among these factors, bilateral hyperlink connections between countries and the number of telephone minutes (communication variables) are the most important predictors of flow structure, followed by trade, physical distance, a common border, and a common language between two countries.

The data analyzed by Marks *et al*. (2018) and Wang (2020) to see if there are possible explanatory variables, and assess the relationships between the variables, for study abroad migration and international student enrollment show that enrollment, financial aid, sociodemographic data, institutional characteristics, support network, and provision of foreign language classes (mainly English) are statistically significant variables. Guru et al. (2021) identified 11 determinants of student attraction and reduced them to 4 factors: role of influencers, environmental and human interface, overhead costs, and quality education.

In the research conducted by Efendi *et al*. (2020) and Wang (2020), the independent variables, work experience, ability to speak a foreign language, having experience abroad, and having a relative or friend abroad, were dichotomized into yes or no. The authors' objective was to verify whether there was bilateral cooperation between the home and destination country for the migration of students and skilled workers. The results showed that

when there is migration agreement for students and workers the intention to migrate increases. Badri *et al.* (2017), finally, assessed the main determinants impacting vocational education in a multicultural and transnational environment. The results indicated that teacher categories (gender and age) and school categories (public or private) had significant effects on teachers' attitudes toward most constructs of professional development for students of various nationalities in Dubai.

The Use of Gravity Models to Survey the Determinants of International Student Demand

While it has been recognized that, globally, migration is multifactorial, previous research on push-pull migration factors has attempted to isolate specific key factors (KAZEMI *et al.*, 2018). The literature shows that the phenomenon of migration is becoming increasingly complex as the effects of political, religious, social, cultural, economic, health-related, educational, and demographic forces strengthen. In this context, the gravity model has assisted in understanding how the combination of determinants can increase the attractiveness of a country's international students in a highly competitive world (CZAIKA; PARSONS, 2017; KAZEMI *et al.*, 2018).

As can be seen from Table 2, in the international migration literature, the push-pull model[1] is widely applied and is usually implemented, empirically, using the gravity equation (LEVATINO, 2017). In the research developed by Bessey (2012), for example, the distance between the home country and Germany, the political situation, and the financing of the migration process made by donations or scholarships were the most significant determinants found in the work to attract international students. The estimated results suggest that the driving forces of student migration differ in some characteristics of international migration as a whole, especially regarding personal income in the states of origin. In addition, the empirical patterns of student migration reveal that there is a high concentration concerning countries of origin.

Frame 1. Contributions from the literature on international student demand using the Gravitational Method

Authors	Objective	Variables
Bessey (2012)	Identify the determinants for choosing Germany as a destination for international students	Distance, home country population, home country GDP, free countries (dummy), landlocked countries (dummy), and EI_enrolled (independent variable).
Beine et al. (2014)	Identify the main determinants of international student mobility for the formulation of effective policies to attract international students.	Total immigrants, total immigrants without higher education, total migrants with higher education, distance, common language (dummy), colonial connection (dummy), price of private higher education, the population of the

[1] Combination of variables used to determine the level of attraction of emigrants from a host country relative to the home country.

		destination country, students enrolled, tuition prices, wages of workers with higher education, cost of living, and EI_enrolled (independent variable).
Levatino (2017)	Investigate the extent to which the macro determinants of student mobility are also related to the enrollment of international students at campuses at home and abroad.	Students enrolled; international students, living in Australia, enrolled; international students, not living in Australia, enrolled; distance, common language (dummy), home country GDP, population, student rate in higher education, international student rate in higher education, unemployed rate, a visa is required (dummy), EI_enrolled (independent variable).
Kouba (2020)	Analyze the determinants of incoming and outgoing students to and from abroad by comparing the faculties of all Czech public universities.	Position in rankings, social science teaching is predominant (dummy), rate of international students enrolled, distance, size of universities, population, emigrant students, EI_matriculated (independent variable).

Source: Elaborated by the authors.

In the article developed by Beine *et al.* (2014), the main conclusions of the authors were that: (1) the factors that measure migration costs are statistically and economically significant; (2) the presence of nationals who have the same educational level or higher stimulates the migration of international students and this allows to have more reliable information about the destination, which can influence the reduction of living and academic costs and the formation of personal and professional support; (3) the quality of education has a moderate weight for the attractiveness of international students and the same happens concerning education costs. On academic fees, the study was inconclusive because it did not separate self-financed students from students with scholarships.

In the Australian context, the results of Levatino's (2017) work suggest that the macro factors that influence enrollment at local campuses are also related to enrollment at campuses located outside the country. The author indicates that the requirement of a visa to enter Australia contributes to people seeking offshore Australian higher education in their own country. In addition, an increase in the satisfaction of demand for higher education in a country is positively associated with the number of people who go to study in Australia. Growth in unemployment in a home country is similarly related to a rise in the number of people seeking higher education directly in Australia and a decrease in those enrolling in the Australian Transactional Higher Education System within their own country.

On the flow of international students, educational managers and policymakers in Higher Education Institutions (HEIs) must consider, when designing internationalization strategies, the interrelationship between incoming and outgoing students. These flows do not operate independently, and administrative policies need to analyze the spillover effects of both. For example, efforts to reduce the number of incoming mobilities (e.g., as a result of

rationalization strategies to cut costs and reduce the number of international partnerships) may, in the long run, negatively affect the number of outgoing students as an unintended consequence. At the same time, if HEIs seek to extend study abroad opportunities to more of their students, they need to evaluate the possibility of receiving more incoming students.

Methodological procedures

The Sample

Several multilateral organizations bring countries together by economic and political themes: BRICS (Brazil, Russia, India, China, South Africa), British Commonwealth of Nations, Mercosur, North American Free Trade Agreement (NAFTA), and the Organization for Economic Cooperation and Development (OECD). Of the multilateral organizations, the G-20 has members from all continents and there is a diversity of languages, cultures, political arrangements, and economic levels among members. The new global political-economic governance crafted by the G20 since the 2008-2009 global financial crisis has had crucial consequences. New inclusive practices have been established that have substantially increased the post-crisis influence of more heterogeneous global governance networks. These expanded networks have included more actors from developing states as well as non-state actors. This has also influenced the expansion of the G-20 agenda, especially after the year 2010 (LUCKHURST, 2020).

Thus, the global governance of the G-20 represents the reality of the geopolitical and economic division of the globe in the second half of the 19th century, and thus it was decided to select as sample 19 member countries of this international body. In addition to these, 11 other countries were selected that do not belong to the G-20 but are neighbors of G-20 countries and therefore compete with them to increase the number of foreign students in their higher education institutions[2].

The Variables

To analyze the number of international students enrolled in a country, the explanatory variable must represent the contributions of political, economic, sociocultural, and academic determinants to attracting such students (CHANKSELIANI, 2018; SIN *et al*., 2019). Determinants (or a combination of them) can explain why one country attracts students from a particular region, while another country attracts from another region or multiple regions of the globe (BARNETT *et al*., 2016; BESSEY, 2012). Such determinants were divided into four groups of independent variables (political, economic, sociocultural, and academic)

[2] The 19 countries that are part of the G20 are Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, the Republic of Korea, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, United States. The 11 countries that are not members of the body and were selected as part of this study are Spain, Netherlands, and Portugal (metropolitan colonies), Austria, Greece, Ireland, Switzerland (European countries that are neighbors of G20 members), United Arab Emirates, Indonesia (Asian countries that are neighbors of G20 members) and New Zealand (Oceania country neighboring Australia).

(Table 3). The political variables are AttractPolicy, PayHEPI, and EqIS, which describe whether there is a specific public policy for attracting international students, whether there are tuition fees charged to higher education students, and whether there is the equal treatment between domestic students and international students regarding tuition payments (CZAIKA and PARSONS, 2017; MARKS *et al*., 2018).

The HDI economic variable is the Human Development Index (HDI), which is composed of the indicators of GDP per capita (calculated based on purchasing power parity - PPP), educational attainment, and life expectancy. The HDI ranges from 0 (zero) to 1 and reflects the level of socioeconomic development of a country (PIRES, 2019). The closer it gets to 1, the higher the quality of life in the country (CZAIKA and PARSONS, 2017; UNDP, 2016).

Socio-cultural aspects are represented by the EngSpeaker variable, which shows whether the destination country has English as an official language, and ColonTies, which indicates whether the country was a European colonial metropolis from the 16th to the 20th century. English-speaking countries and former European colonial metropolises are the most attractive destinations for international students (FRANCE; ALVES; PADILLA, 2018; WANG, 2020).

Regarding academic issues, there is the variable Errol, which indicates the number of international students enrolled in each country; the PopDest2029, which presents the range of the population with potential for a higher education course; the StudPop, which makes up the number of students enrolled in the higher education system; and the CWUR which refers to a world ranking list of universities[3]. Data on the total amount of students enrolled (StudPop), the top 10 countries of origin of international students (IS_Top10), and the total number of international students enrolled (Erroled_IS) in each national higher education system, are also academic variables analyzed (KOUBA, 2020; MARKS *et al*., 2018).

The variables that identify each country are Name Destiny, the destination name of the country where the student is enrolled; Time, the time range of study assessment; IS_Top10, which concerns the name of the student's country of origin; PoupDest, referring to the destination population of the student's destination country.

Finally, other variables that are not part of the four determinants but are relevant in

[3] The global university ranking portal CWUR ranks universities based on four indicators (CWRU, 2019): quality of education, measured by the number of alumni who have won major academic awards relative to the size of the university (25%); alumni employability, calculated by the number of alumni who have held executive positions in the world's largest companies relative to the size of the university (25%); faculty quality, as measured by the number of awards received by faculty members (10%); and research performance, which is measured by the number of articles published, by articles published in high-impact journals, and the number of citations obtained by articles published by faculty members at each university analyzed. However, there is no standardization on teaching and learning methods, resources, and faculty training among national education systems, which makes the ranking biased by the interests of the companies that make the lists of the academic ranking portals (ALTBACH, 2012; BARNETT *et al*., 2016).

explaining the attractiveness of international students to a given country, were also used in the analysis: the air distance between the capitals of the country of origin and destination (Distance), influence on the transit cost of the migrant student. PopDest and PopDest2029 are variables that show the level of access of the national population to the local higher education system (BEINE; NOËL; RAGOT, 2014; LEVATINO, 2017).

Frame 2. Variables used to compose the database, definition, and data source

Variable	Definition	Expected Signal	Source
AttractPolicy	The destination country has a policy of attracting international students (0=no or 1=yes).	+	Website of the ministries of education or higher education.
PayHEPI	Nationals pay tuition fees at public institutions of higher education (0=no or 1=yes).	+	Website of the ministries of education or higher education.
EqIS	There is equal treatment of students. Nationals and foreigners have equal treatment in tuition payments (0=no, 1=with some countries of origin, or 2=yes).	+	Barnett et al. (2016); Beine et al. (2014); Efendi et al. (2020)
HDI	Human Development Index of the destination country.	+	United National Organization (UN) https://www.un.org/
EngSpeaker	Destination country is English speaking (0=no or 1=yes).	+	Governments' web pages.
ColonTies	The destination country was a European colonial metropolis (0=no or 1=yes).	+	(FRANÇA; ALVES; PADILLA, 2018; SIN; ANTONOWICZ; WIERS-JENSSEN, 2019)
Errol	Several international students enrolled in the higher education system of the destination country.	+	UNESCO http://data.uis.unesco.org/
PopDest2029	The population of the destination country is between the ages of 20 and 29.	+	Organization of the United Nations (UN) https://www.un.org/
StudPop	Several students enrolled in the higher education system of the destination country.	+	United Nations Educational, Scientific and Cultural Organization (UNESCO) http://data.uis.unesco.org/
CWUR	Many universities, by country, are in the 3rd quartile.	+	https://www.cwur.org/
Name_Destiny	Name of the destination country.	+	United Nations Educational, Scientific and Cultural Organization (UNESCO) http://data.uis.unesco.org/
Time	Data evaluation period 2009-2018.	+	-
IS_Top10	The first 10 countries of origin of the students.	+	UNESCO http://data.uis.unesco.org/ and Ministry of Education http://en.moe.gov.cn/
PoupDest	The population of the destination country.	+	Organization of the United Nations (UN) https://www.un.org/
Origin	Name of the student's home country.	+	United Nations Educational, Scientific and Cultural Organization (UNESCO)

			http://data.uis.unesco.org/
Distance (km)	Distance between the capitals of the countries of origin and destination.	-	Distance calculator https://pt.distance.to/

Source: Elaborated by the authors.

Estimation Model and Strategy

To identify the determinants that may contribute to countries being attractive to international students, the Poisson Pseudo-Maximum Likelihood (PPML) method was used in estimating a gravity equation. This method has proven important in avoiding potential econometric problems arising from a combination of heteroscedastic residuals and bilateral flows equal to zero. Through Monte Carlo simulations, Santos-Silva and Tenreyro (2006) assert that the PPML estimator can effectively deal with these problems, unlike traditional estimators, which eventually produce biased parameter estimates, especially in estimates of nonlinear gravity models in their original form.

The estimated gravitational equation (equation 1) is derived from a theoretical model that indicates political, economic, sociocultural, and academic variables that may contribute to students choosing to study abroad. These variables, which are shown through a university ranking portal, include the size, the level of inclusion of the young population in higher education and the quality of the higher education system, the existence of public actions of attractiveness, and cultural aspects of the destination country, as well as the cost of transit and the level of human and social development of the country.

$$Errol = \beta_1 + \beta_2\, Ln(Distance) + \beta_3 Ln(PopDest) + \beta_4\, Ln(PopDest2029) + \beta_5 Ln(StudPop) + \beta_6 Ln(HDI) + \beta_7 EngSpeaker + \beta_8 AttractPolicy + \beta_9 ColonTies + \beta_{10} PayHEPI + \beta_{11} EqIS + \beta_{12} CWUR + \epsilon_0$$

Where:

Errol is the dependent variable showing the number of international students enrolled in each country in this study;

Distance is the distance between the capital of the home country and the destination country;

PopDest is the population of the destination country;

PopDest2029 is the population of the destination country aged 20-29;

StudPop is the population enrolled in higher education (undergraduate, master's, and doctoral degrees);

HDI is the Human Development Index;

EngSpeaker is a binary variable: 1, the destination country is an English speaker, or 0 (zero), the destination country does not speak English;

AttractPolicy is a binary variable: 1, the destination country has an attraction policy, or 0 (zero), the destination country has no attraction policy;

ColonTies is a binary variable: 1, the source and destination country had colonial relations, or 0 (zero), there were no colonial relations between the source and destination country;

PayHEPI is a binary variable: 1, nationals pay to study at public higher education institutions, or 0 (zero), nationals do not pay to study at public higher education institutions;

EqIS is a nominal variable: 0, there is no equal treatment between domestic and international students in the public higher education system of the destination country, 1, Yes, with some countries, and 2, Yes, there is the equal treatment between domestic and international students;

CWUR is the number of universities in the destination countries ranked in the 3rd quartile;

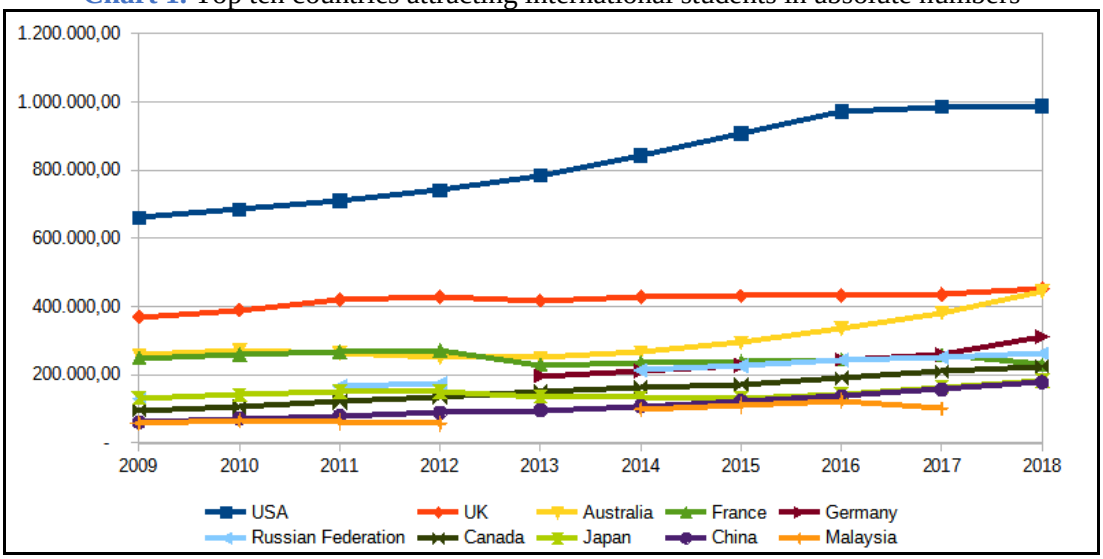
ϵ_0 é is the error associated with the model;

β_i are constants.

Results and Discussions

Figure 1 shows that among the 10 countries that attract the most international students, 9 countries are members of the G20, 4 have English as their official language, 8 have 30% or more of young people aged 20-29 years old in higher education, 2 were European colonial metropolises, 2 were colonies of these countries, 9 have universities among the top 100 in the CWUR university ranking portal, and all countries have public policies to attract international students (OECD, 2016; UNESCO, 2018). These data reinforce those political, economic, sociocultural, and academic variables alone or together are necessary to understand how a national higher education system manages to develop actions for the internationalization of its universities and, in particular, how they attract foreign students (KNIGHT, 2012; KNIGHT and DE WIT, 1995).

Chart 1. Top ten countries attracting international students in absolute numbers



Fonte: (UNESCO, 2018)

To understand how the contribution of each dimension individually or jointly can impress international student attraction, Table 1 presents the results of the estimation of the gravity model by the PPML method. First of all, it is noteworthy that almost all coefficients found present statistical significance, with more than 95% confidence, with the natural logarithm of the Distance variable and the PayHEPI and EqIS variables being exceptions in this regard. The degree of fit of the model, R-quad., is also satisfactory, showing that the model explains 83.30% of the variation in the number of international students that each country attracts to its national higher education system.

As for the coefficients found, the only variable that did not exhibit the expected sign was the natural logarithm of the StudPop variable. The negative result of this variable may be reflecting the occupancy rate of vacancies offered by national students in the national higher education system, that is, the higher the occupancy rate, the lower the possibility of vacancies being offered to international students.

Table 1. Results of the estimations by the PPML method

Variables	Coef.	Robust Standard Error	P>|z|
LnPopDest	.0489614	.0074615	0.000
LnPopDest 2029	.0560143	.0075153	0.000
LnStudPop	-.0469792	.0062123	0.000
LnHDI	.8534726	.0519704	0.000
LnDistance	.0018517	.0037952	0.626
EngSpeaker	.0179762	.0076643	0.019
AtrractPolicy	.0951831	.0165414	0.000
Colon_Ties	.0243552	.0084809	0.004
PayHEPI	.0117526	.0071455	0.100
EqIS	.0003227	.0073313	0.965
CWUR	.000515	.0001523	0.001

Number of observations: 2,425

R^2 = .83301274

Source country fixed effects: Yes
Fixed effects for the destination country: No

Source: Elaborated by the authors.

Although Brettell and Hollifield (2015), Castles and Miller (2009), and King (2012) point out that one of the reasons that limit the migration of people across borders is that moving from one country to another requires a sound financial structure, and in the estimated model, the three variables that are related to the cost of the migration process, LnDistance, PayHEPI, and EqIS, were not statistically significant. These results are in line with Beine et al.'s (2014) insight that financial costs are not statistically significant. The fact that the cost of transportation (measured by the distance between home and destination country), tuition fees, and the differentiation of amounts paid between nationals and foreigners in academic and housing costs were not perceived as a barrier for this typology of migrants, can perhaps be explained by public or private funding or scholarship provision by countries for international students (BEINE; NOËL; RAGOT, 2014; HAWTHORNE, 2018).

The results of the variables LnPopDest, LnPopDest2029, and LnStuPop, which are related to each other, hint that the democratization of access for domestic students contributes to attracting foreign students, as it serves the national interest of producing knowledge and training people, and also allows the offer of places to foreign students. Economic, political, and communication instruments are essential for the operationalization and effectiveness of any public policy (SÁ; SABZALIEVA, 2016). In this line, the AttractPolicy variable was statistically significant in the estimated model. It can be inferred, therefore, that financing events for the dissemination of the selection processes and enrollment in universities, subsidies for housing, transportation, food, cultural activities, and actions to facilitate obtaining visas and diploma recognition are policy factors capable of attracting international students (FRANCE, 2019; OECD, 2016; SIN; ANTONOWICZ; WIERS-JENSSEN, 2019).

Countries with political, economic, or cultural hegemony at the global or regional level, as well as countries with similar languages and that share cultural and religious values, are more likely to attract students among themselves than countries that do not speak the same language, do not profess the same faith, traditions, and cultural values, or countries that are not political, economic, or cultural powerhouses (ALTBACH, 2012; FRANCE; ALVES; PADILLA, 2018; WANG, 2020). These factors are in line with the results found for the ColonTies and EngSpeaker variables, which showed statistical significance, indicating that having colonial relationships and having a higher education system in which English is spoken can contribute to attracting students. These connections between countries, therefore, are determinants for attracting international students. Former European metropolises are among the top destinations for international students because they share a common language and religious and cultural values. These characteristics facilitate the integration process of the destination countries and the construction of social relationship networks (FRANCE; ALVES; PADILLA, 2018; NADA; ARAÚJO, 2018; SIN; ANTONOWICZ; WIERS-JENSSEN, 2019). Nigerians and Indians, for example, have the United Kingdom as one of

their main destinations for obtaining an academic degree; nationals from Algeria and Cameroon prefer France; Peruvians and Colombians seek Spain, and Brazilians and Angolans go to Portugal (UNESCO, 2018).

The results of the CWUR variable reflect the importance of geopolitical power in explaining the top international destinations for obtaining academic degrees. University ranking lists are influenced by the geopolitical power of countries that want to see their universities in the top positions, since this means academic reputation, even if the criteria for evaluating higher education systems are different around the planet (ALTBACH, 2012; GURU; BHATT; AGRAWAL, 2021). Moreover, integration with higher education policies needs to be taken into account when analyzing university ranking lists. The activities of institutions and agents (faculty and technical and administrative staff) should also be analyzed at the meso-institutional level, in offering courses, scientific production, internships, and medical and psychological assistance as comparative parameters to measure the level of teaching and scientific products and services provided. The ranking and quality of higher education institutions and the cost factors related to studying higher education (e.g. accommodation and living costs) need to reflect the quality of higher education rather than the geopolitical position of a country (BARNETT *et al*., 2016).

In turn, income level, labor market access, perceived safety and security, and social protection are economic and social determinants in finding a country to study (ABBOTT; SILLES, 2016; HAWTHORNE, 2018; KRITZ; GURAK, 2018). Thus, showing that a particular destination has a good institutional environment to study and the possibility of obtaining work after completing the course explains why the variable LnHDI was included in the estimated model, with a statistically significant result. In general, the estimated model indicates that countries with high HDI, which have an inclusive higher education system, English speaking, with universities ranked in the first quartile among the best in CWUR, which have formulated and implemented student attraction policies are the most attractive countries. The three countries that attract students the most are the United States, the United Kingdom, and Australia, in addition to Canada and New Zealand, which represent this cluster (BARNETT et al., 2016; BECKER; KOLSTER, 2012; LAIFER; KITCHEN, 2017). In turn, Germany, the Netherlands, and Japan are examples of countries with high pull, thanks to their high HDI and an inclusive higher education system, even though they are not English-speaking or colonial metropolises.

Some countries are not in the South-North direction of migration flows, which are centers of attraction for international students due to one or more variables of the model. China and Russia have neighbors with similar languages, inclusive national education systems, and policies to attract international students (MKHOYAN, 2017; WU, 2019). India and South Africa are countries that have English as an official language, neighbors that share the same language, and policies to attract international students (GURU; BHATT; AGRAWAL, 2021; MACRANDER, 2017). Saudi Arabia and the United Arab Emirates are Arab countries whose neighbors share the same language and religion. These countries have student attraction policies directed towards Muslim countries and Arab culture (BECKER;

KOLSTER, 2012; KAUSHAL; LANATI, 2019). In Latin America, Argentina shares borders with Spanish-speaking countries and Brazil, a Portuguese-speaking country. The Spanish and Portuguese languages come from the Latin language. Brazil has a student attraction program targeting its South American neighbors (BECKER ; KOLSTER, 2012; DE WTT *et al*., 2005).

Final Considerations

The objectives of this study were to measure the attractiveness of a group of countries for international students and to identify the determinants that may contribute to the attractiveness of certain countries for international students. The results found pointed out that the main determinants of this attractiveness are the political factors (systematized policy for attracting students), academic (the relevance of the ranking of universities for the attractiveness of a country), economic (the perception that there is safety, labor market, fair pay, and social and political environment through the HDI), and cultural (the cultural ties, similar language, and relations with former colonies).

The contribution of this work to the knowledge of academic migration was focused on the joint analysis of these four factors on data from countries that are members of the G20. The technique for estimating the model was Poisson Pseudo-Maximum Likelihood, which proved suitable for analyzing international student migration flow. The study indicated that the main flow of international students is countries with high HDI, with higher education systems, that provide training opportunities for a large part of their population between 20 and 29 years old, with government actions, the presence of higher education institutions to attract international students and English speakers. The United States, the United Kingdom, Canada, and Australia are the main destinations with these factors.

Countries that are not English-speaking, but that are countries in the center of capitalism and present a policy of attraction, also have a high force of attraction. France, with its Welcome to France policy, China, using scholarships for students from semi-peripheral and peripheral countries, and Germany, with actions to attract students from neighboring countries of the European Union. But countries that do not have all these attributes are also destinations for academic migrants, due to colonial ties, similar languages, and governmental and institutional actions. Spain and Portugal are important destinations for the educational training of immigrants from former colonies; Argentina attracts immigrants from neighboring countries in South America because they speak the same language (Spanish) or a similar language, such as the Portuguese spoken in Brazil; and Malaysia attracts Chinese-speaking students who live in other countries (such as Indonesia, Singapore, and Taiwan).

Attracting international students is a national and institutional action, and this study focused on macro-environment variables, such as distance between origin and destination, governmental actions, cultural and political ties, academic reputation, and cost of migration and stay. Institutional actions such as academic programs aimed at international students, disciplines focused on problems of international or global scope, and training of teachers and technical and administrative staff for the reception and integration of foreigners were not

analyzed in this article and should be deepened further studies.

Finally, the Covid-19 pandemic impacted international air transportation and decreased the capacity of states and institutions for higher education, health services, housing, public transportation, and academic services. The impacts that Covid-19 had on the flow of international students, and what actions to reverse it, also deserve attention and need to be included in the research agenda on migration and higher education policies.

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