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International mobility and education inequality among Brazilian undergraduate students

Alice Dias Lopes

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The University of Edinburgh

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Declaration

I declare that this thesis was composed by myself, that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has not been submitted for any other degree or professional qualification.

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Abstract

In the last fifteen years, the Brazilian government has implemented educational policies intended to expand access to higher education for students from disadvantaged socioeconomic backgrounds. At the same time, research has observed the increase in the demand for international mobility of students from middle and upper classes. This PhD thesis aimed to understand the effect of international mobility among Brazilian undergraduate students on educational inequality by examining the Science Without Borders (SWB) programme. This programme was established in July 2011 by the Brazilian Federal Government with the aim to promote the expansion and the internationalisation of science and technology, and increase Brazilian competitiveness through international exchange and mobility. The programme distributed 101,000 scholarships between 2011 and 2015 for undergraduate and graduate Brazilian students to study in a foreign university.

The thesis draws on research on educational inequalities and international mobility. The research on education inequalities showed that in many developed countries, after the expansion of education, students from privileged socioeconomic backgrounds seek to maintain their education advantage through distinctive educational trajectories. The international mobility research also indicated that students from more advantageous socioeconomic backgrounds are more likely to pursue international mobility as a strategy for maintaining their privilege. However,

international mobility programmes that offer financial bursary attract students from lower socioeconomic backgrounds as well. Hence, this research examined whether international mobility programmes which offer scholarships may operate as a mechanism for opening up opportunities in the education system.

The dataset used for the study was created thanks to the collaboration of three different intuitions: the two funding bodies of the SWB programme and the National Institute for Educational Studies and Research (INEP). The negotiations to access the data lasted around a year and a half, and was only agreed after the anonymity of the students were guaranteed. INEP merged data from the High School National Exam (ENEM) datasets with the information provided by the two funding bodies to identify students who attended the SWB programme between 2011 and 2014.

Probit regression models were used to examine the association between students' socioeconomic backgrounds and the likelihood of participating in the SWB programme. The models showed that students with parents with higher levels of education and higher income were more likely to receive a SWB scholarship. In other words, there was inequality in access to the programme. Therefore, the financial bursary offered by the Brazilian government did not eliminate the effect of students' socioeconomic characteristics on access to this programme. Multilevel models were used to analyse the association between students' socioeconomic background and prestige of the foreign university attended. The models demonstrated that there was also inequality within the SWB programme: stu-

dents from more advantageous socioeconomic background tended to study in more prestigious universities. These results corroborate the results from the international mobility literature and suggest that students from privileged socioeconomic backgrounds might pursue international mobility to maintain educational advantages.

These results have important implications for educational policies in Brazil. In addition to the effort to expand access to higher education, the government should also assure that inequalities are not being transferred to other areas, such as in the case of international mobility.

Lay Summary

This PhD thesis analysed the relationship between international mobility and education inequalities among Brazilian undergraduate students by examining the Science Without Borders (SWB) programme. This programme was established in July 2011 by the Brazilian Federal Government with the aim to promote the expansion and the internationalisation of science and technology and increase Brazilian competitiveness through international exchange and mobility. The programme distributed 101,000 scholarships between 2011 and 2015 for undergraduate and graduate Brazilian students to study in a foreign university.

Statistical modelling was used to examine whether there was inequality in access and within the SWB programme. First, the effect of students' socioeconomic backgrounds on the probability of participating in the programme was examined. After, the effect of students' socioeconomic background on the prestige of the university of destination during the programme was analysed. The results showed that students from a more advantageous socioeconomic background (higher parental education and higher family income) were more likely to participate and study in a more prestigious university during the programme. These results have important implications for educational policies in Brazil. In addition to the effort to expand access to higher education, the government should also assure that inequalities are not being transferred to other areas, such as in the case of international mobility.

Chapter 1

1 Introduction

From the beginning of the 1980s until the mid 1990s, Brazil was in a deep economic recession. The annual inflation rate on consumer prices reached 2,974 per cent (World Bank, 2017a), the GINI[1] coefficient was equal to 60.49 (World Bank, 2017b), and about 20.6 per cent of the population in the country was living on less than US$1.90 a day (World Bank, 2017c). In the mid 1990s, Brazil achieved macroeconomic stability largely as a result of the economy stabilisation plan, the country's growing participation in international trade, and the increasingly high prices of non-tradable goods (Rocha, 2000). Since then, the annual inflation rate has dropped significantly and maintained lower than ten percent between 2005 and 2015 (World Bank, 2017a), the GINI coefficient reached its lowest in 2014 (51.48), despite continuing to be one of the highest in the world (World Bank, 2017b), and in 2015 only 3.7 per cent of the population was living under the poverty line (World Bank, 2017c). In addition to the economic improvements, after a long period of dictatorship (1962-1988) and political instability (1989-1994), Brazil also reached political stability in the mid 1990s.

Between 1995 and 2002, the country was governed by Fernando Henrique Cardoso,

[1]The GINI coefficient measures countries' inequality. The GINI coefficient ranges from 0, perfect equality, to 100, perfect inequality (World Bank, 2017b). For example the GINI coefficients for the United Kingdom and Sweden in 2012, last information available in the World Bank website were, respectively, 32.57 and 27.32

a member of the centre Brazilian Social Democracy Party, and between 2003 and 2016 by Luís Inácio Lula da Silva and Dilma Rousseff, members of the left-wing Worker's Party. With this steady economic growth and political stability, Brazil was coined one of the four emerging economies (together with Russia, India and China) by Jim O'Neill (O'Neill, 2001), former Goldman Sachs chief economist. According to O'Neill's predictions, these four emerging economies (denominated the BRICs countries) would be larger than those of the current six largest industrialised democracies (France, Germany, Italy, Japan, the United Kingdom, and the United States) by the year of 2041 (O'Neill et al., 2005).

When I started my PhD in October 2013, Brazil was still considered a very promising country. The economy was still prosperous, and a democratically elected government had been in power for almost 20 years. Nevertheless, in 2016, during the third year of my PhD, corruption scandals and an economic crisis threatened the country's new position as a global power. The three covers of The Economist concerning Brazil in the last seven years illustrate the shift in the country's image worldwide (Figure 1). Once a promising country, Brazil now needs rescue. The increasing unemployment and inflation rates, together with the corruption scandals, have led to the impeachment of the president Dilma Rousseff, initiating a new period of political instability. After the very controversial impeachment proceedings, Michel Temer, a member of the centre-right Brazilian Democratic Movement party and the Brazilian vice-president, assumed office in August 2016. This thesis does not intend to discuss the merits of the

impeachment or its implications to Brazilian democracy. This brief introduction to the Brazilian economic and political context in the last 20 years aims to point out that the period which is analysed in this thesis - between 2011 and 2014 - corresponds with a uniquely prosperous period in Brazilian society.

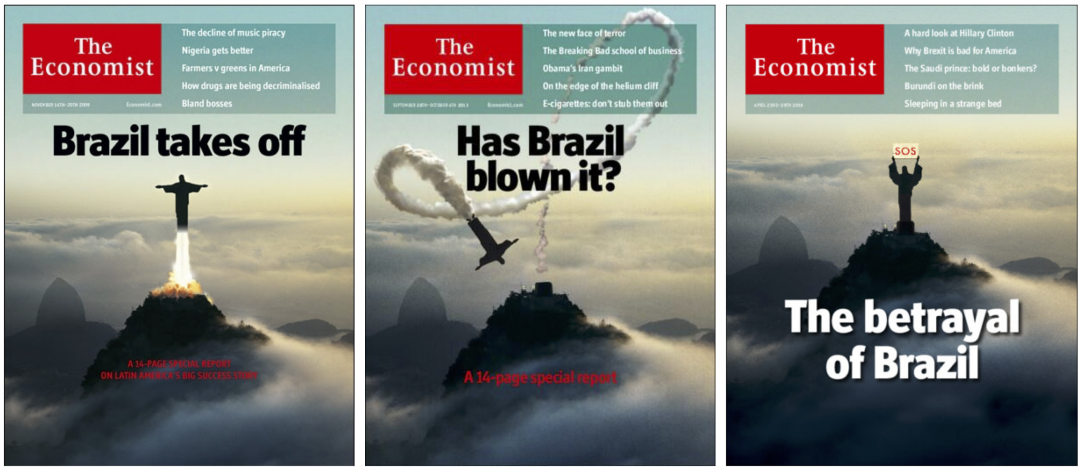


Figure 1: Covers of the Economist Concerning Brazil Between 2009 and 2016.

The Science Without Borders (SWB) programme, which is used to analyse the relationship between education inequalities and international mobility, is an example of the educational policy implemented during this thriving period of Brazil. The aim of the programme was to promote both the expansion and the internationalization of science and technology, and increase Brazilian competitiveness through international exchange and mobility. The programme intended to distribute 101,000 scholarships between 2011 and 2015 for undergraduate and graduate Brazilian students in science, technology, engineering, and mathematics fields of studies. At the same time of the implementation of the SWB programme,

Brazil was undergoing an expansion of opportunities in higher education designed to reduce the persistent and substantial social inequality in the country. Starting in 2001, several higher education institutions started implementing social and/or racial affirmative action policies. The federal government also implemented several policies aiming to increase the number of students in higher education, by creating institutions in remote places in the country, increasing the capacity of existing universities, and allocating 50 per cent of places in federal universities to students who attended public upper secondary schools[2].

This thesis therefore aims to understand the association between international mobility and educational inequality among Brazilian undergraduate students during this period of expansion. Two distinct lines of research were used: one regarding international mobility, and the other dealing with education inequalities. On one hand, the literature on international mobility mainly focuses on which students study abroad during their educational trajectories. On the other hand, the majority of studies on educational inequalities analyse the impact of students' socioeconomic background on their transition from lower to higher educational levels (Breen and Goldthorpe, 1997; Lucas, 2001; Raftery and Hout, 1993). However, the effects of socioeconomic characteristics on the probability of participating in studying abroad and the consequences those effects have received little empirical attention from either line of research. Combining the two conceptual frameworks, the research questions posed are as follows:

[2]The structure of the Brazilian higher education system will be discussed extensively in the Background chapter.

Research Question 1 (RQ1): Is there a relationship between students' socioeconomic backgrounds and their likelihood of participating in the SWB programme?

Research Question 2 (RQ2): Is there a relationship between students' socioeconomic characteristics and the prestige of the university of destination within the SWB programme?

For analytic purposes, the first research question is referred as 'inequality in access to the SWB programme' throughout the thesis. This research question aims to understand which students benefit from the international mobility programme implemented by the Brazilian government. The research on international mobility shows that students who study outside their home country tend to be from a more privileged socioeconomic background. However, some research also shows that students from disadvantaged socioeconomic backgrounds were more likely to pursue international mobility when a financial bursary is offered. The second research question seeks to investigate possible inequality within the SWB programme. The aim of this research question is to test whether students from different socioeconomic backgrounds attend different higher education institutions during the SWB programme. The research on international mobility shows that students from advantageous socioeconomic backgrounds usually attend more exclusive types of education during international mobility.

By answering these two questions, this research aims to contribute to the literature on international mobility by showing who the students participating in

international mobility programmes in Brazil are, and fostering understanding of how socioeconomic background plays a role in participation and type of international mobility. Moreover, this research also aims to contribute to the literature on education inequality by discussing how international mobility may affect this issue during a period of expanding opportunities for education.

The High School National Exam (ENEM) datasets were used to examine the relationship between international mobility and education inequality. The ENEM is a non-compulsory yearly exam designed to evaluate upper secondary students in Brazil. Apart from assessing students' learning in upper secondary education, the ENEM requires that students participating in the exam complete a socioeconomic questionnaire. Since 2009, the ENEM exam has been used as an admission test in several Brazilian higher education institutions, and has also been taken into account during the selection process of the SWB programme. Students must attain 600 points or more on the ENEM in order to be eligible to apply for SWB undergraduate scholarships. At my request, the institution responsible for coordinating the ENEM created an indicator variable for students participating in the SWB programme on the ENEM datasets. Acquiring these datasets with the indicator variable required one and a half years of negotiations with three different institutions: the institution responsible for coordinating the ENEM, and the two funding bodies of the SWB programme. The datasets to analyse the SWB programme were only created after the anonymity of the students was guaranteed. This is the first time that a researcher has acquired these datasets, meaning

that this represents a unique opportunity to investigate the relationship between international mobility and educational inequality in higher education.

This research was informed by my own experience as an international student during my academic studies. I understood very early on that studying abroad would be an advantage if I was going to pursue an academic career. As an undergraduate student, I was part of a research group that studied the increasing demand for international mobility by students from middle and upper-class students. I learned about several international mobility programmes that were available at the undergraduate level and about how studying abroad would help me pursue postgraduate studies. As an undergraduate student, I applied for a South American international mobility programme that covered tuition and offered a stipend. Following my undergraduate experience, I decided to study abroad during my postgraduate studies (Master and PhD).

After obtaining some advantages by participating in an international mobility programme as an undergraduate student (for example, experience with the bureaucracy involved with international mobility, confidence to be far from my social network, and some familiarity with the application process in foreign universities), I became interested in the topic of international mobility and education inequalities. When I applied for my PhD, I wanted to learn about who were the students pursuing international mobility programmes during their undergraduate studies in Brazil, whether their socioeconomic background played any significant role in the decision to study abroad and whether pursuing international mobility

would present an advantage in the labour market. Moreover, the implementation of the SWB programme, around the time I became interested in the use of quantitative methods in the Social Science, was a great opportunity to understand the impact on international mobility on education inequalities among Brazilian undergraduate students using an extensive dataset.

Chapter 2

2 Literature Review

2.1 Research on Student International Mobility

2.1.1 International Education Flows

In the twenty-first century, the increasing geographic mobility and interest in the international expanded individuals' boundaries beyond the nation-state. In education, the increase in international mobility promoted a new education order (Ramos, 2009) founded by the creation of the world educational market and the growing internationalisation of educational policies. According to Education at a Glance 2016 (OECD, 2016), among the OECD countries, the number of international students in higher education increased by 50 per cent between 2005 and 2012. Despite the significant increase, international education flows continued to be stratified according to hierarchical relations between core, semi-periphery and periphery (Marginson, 2008; Weiss, 2005). Of the international students enrolled in a higher education institution, more than 50 per cent were enrolled in seven countries (Australia, Canada, France, Germany, Japan, the United Kingdom, and the United States) (OECD, 2015). Around 73 per cent of all students were enrolled in an OECD country.

International mobility is therefore spatially uneven: mainly from developing coun-

tries to developed countries and from a non-English speaking to an English speaking country (Brook and Waters, 2011). Moreover, as the data from the OECD demonstrates, only a few countries are benefiting from the expansion of student international mobility. The unevenness of international students flows result in an increasing competition among countries and institutions to attract international students paying high tuition fees. The growing competition among countries and universities is explained by the fact that "(...) institutions of higher learning, faced with reduced state financial support in many countries, have had to operate under an increasingly market-oriented approach. Such a shifting emphasis within the higher education sector led to the recruitment of overseas students as a source of revenue" (Naidoo, 2006, p.327).

The geographical difference in student international mobility is endorsed by the world university rankings. They operate according to a principle of inclusion and exclusion: on the one hand, universities that frequently appear in world universities rankings attract high-achieving students, better researchers and more funding. On the other hand, universities that do not appear in world universities rankings have their importance reduced. As a consequence, world universities rankings helped increase the gap between elite and mass higher education by promoting the growth of institutional stratification and research concentration (Hazelkorn, 2007; Marginson, 2007).

Through the analysis of the Shanghai, QS and Times Higher Education rankings, Jöns and Hoyler (2013) showed the world universities rankings are a reflection

of wider global socioeconomic inequalities - favouring Anglophone and economically developed countries. Moreover, as argued by Brook and Waters (2011), they create a myth around the higher education system in certain countries and institutions, such as the Ivy Leagues universities in the United States and Oxford and Cambridge universities in the United Kingdom.

The growing market for international student mobility has instigated governments and higher educations institutions to create strategies to attract international students, which helped influence the patterns of students flows. Findlay (2011), analysing the supply-side of international student mobility, discussed the role of British international education agencies, such as the British Council and university international offices, and international student policies implemented by the British government in expanding the country's higher education market (mainly to India and China).

Findlay et. al (2017), examined the marketing, recruitment and branding strategies implemented by British universities to attract international students using in-depth interviews with stakeholders from international office from British universities. The authors showed that, although admitting that the financial gain was an important factor, the stakeholders cited the ambition of being a global university as the main driver for attracting international students. However, these institutions focus on recruiting international students from few countries (the majority of international students in the higher education institution analysed were from China or India).

Raghuram (2013) has drawn attention to the challenges of understanding student migration in the context of other types of migration (such as labour and family migration). Despite the deterioration of the boundaries between student and other types of migrations, acquisition of knowledge is the still the main drivers of student migration. Iannelli and Huang (2014), analysing international student mobility in China, showed that the Chinese government promoted international mobility to build a highly-qualified labour force. Moreover, the Chinese government funded a large number of students in the STEM field of studies, which were considered essential to ensure continued economic growth.

2.1.2 International Student Mobility and Education Inequalities

Despite understanding the importance of the different agents of student international mobility on understanding international mobility flow, the majority of research on student international mobility analyse the student perspective or the demand-side. These studies attempt to understand the relationship between international mobility and education inequalities by investigating who are the students pursuing international mobility during their educational trajectories. They strongly relies on Pierre Bourdieu's analytical framework to examine the relationship between international mobility and education inequalities.

Bourdieu presented the idea that education was a mechanism of social reproduction. However, instead of focusing on the effect of economic resources on education inequalities, the French sociologist analysed education inequalities through

cultural distinctions (Masson, 2014). The social reproduction occurs when the school requires from students the culture and values of the dominant classes. Therefore, students from privileged socioeconomic backgrounds tend to have a culture that is more harmonious with the school culture, while students from disadvantaged socioeconomic backgrounds are evaluated according to a scale of values that is different from their home environment. For that reason, students from a more advantageous socioeconomic background tend to have a natural relation with the school, making success more likely in this social environment (Bourdieu, 2003). The cultural advantage that students from privileged socioeconomic backgrounds hold was defined as cultural capital.

However, despite Bourdieu's contributions to the research on education systems and the reproduction of class structure, his work received several criticisms. The most current criticism to Bourdieu's work was regarding his theoretical ambiguities and gaps (Sullivan, 2001). Lamont and Lareau (1988) demonstrated how the concept of cultural capital changed throughout his work, and examine how the misunderstanding of the concept has led to different interpretations in the United States. The lack of definition of the concept of cultural capital influenced several researchers to discuss how cultural capital has been operationalized in different ways in educational research (Graaf, Graaf, and Kraaykamp, 2000; Jæger, 2011; Kingston, 2001; Sullivan, 2001). The most frequent indicator of cultural capital used in quantitative research is parental education and participation in highbrow culture. However, studies have also considered parental cultural

engagement, reading habits, extracurricular activities, and educational resource at home as proxies for cultural capital (Jæger, 2011). Furthermore, Kingston (2001) discussed how researchers have so far struggled to demonstrate that the relationship between academic achievement and cultural capital is nonspurious. The lack of secondary data on children and parental cultural practices also led to the problem of omitted variables (Sullivan, 2001). Because of theoretical complications, Goldthorpe (2007) suggested that researchers, when analysing the relationship between cultural influences and educational attainment, should abandon the concept of cultural capital in favour of a theoretically more neutral and more limited one such as cultural resources (p.19).

The research on student international mobility argues that international mobility might be a mechanism to maintain education inequalities, as the educational system values the abilities that are acquired through international mobility, and the access to it is unequal across socioeconomic backgrounds (Igarashi and Saito, 2014, p.10). Moreover, as Netz and Finger (2016) argue: "in societies that need high skilled graduates with international experience, this may constitute a mechanism to transferring inequalities from the education system to the labour market" (p. 79). Nevertheless, the research on international mobility has the same ambiguities presented in Bourdieu's work. These studies defined the advantages acquired through international mobility in several different ways: as a form of cultural capital, a global cultural capital, a mobility capital, or a capital on its own. Moreover, they measured this capital in different ways, such as number of

trips abroad, foreign language knowledge, and cultural practices. Despite using different terms for the advantages acquired in international mobility, these studies try to understand the social reproduction nature of international mobility.

The majority of the research on the relationship between international mobility and education inequality shows that students from a more advantageous socioeconomic background are more likely to pursue international mobility. However, as highlighted by Brook and Waters (2009) when analysing British students who pursued international mobility, some distinctions should be made between students who pursue an undergraduate and students who pursue a postgraduate degree in a foreign country. While postgraduate students from the UK are from a more diverse socioeconomic background and educational trajectories, undergraduate students are from a more privileged socioeconomic background and were more likely to have studied in a private school. Moreover, Iannelli and Huang (2014) also drawn attention to the fact that Chinese undergraduate students were more likely to self-fund their studies abroad when compared to postgraduate students. Therefore, the undergraduate student mobility is more likely to be driven by individuals' expectations of improving labour market outcomes.

Brooks and Waters (2011) in the book *Students Mobilities, Migration and the Internationalization of Higher Education* analysed the motivation for studying abroad in three groups: East Asian, Mainland Europe and British students. Different from students in Mainland Europe who tend to pursue "credit mobility" (for example: studying a semester in a foreign university), students from East

Asian countries tend to pursue "diploma mobility". Therefore, they study during the whole undergraduate or postgraduate degree in a foreign university. The research on international mobility showed that East Asian international students usually immigrate with their families at a very young age. The main motivation for moving is to accumulate cultural capital and fluency in the English language. Some research also showed that gender inequality in East Asian countries represent a motivation for female students to pursue international mobility in order to escape patriarchal structures. The research on Mainland European students showed that the majority of the students who pursue international mobility are from higher socioeconomic backgrounds. However, some research demonstrated (i.e., Favell, 2008) that international mobility might be seen as an alternative route to capital accumulation for students from lower socioeconomic backgrounds.

Brook and Waters also highlighted the policy aspect of international student mobility programme in Mainland Europe. The creation of the Erasmus programme[3] by the European Union had specific political and economic objectives. The international mobility programme produces highly educated and mobile labour forces, which increase European economic competitiveness and creates a European identity, which is fundamental for the legitimization of European institutions. Last, the research on students in the Britain showed that students are from privileged socioeconomic backgrounds. They pursue international mobil-

[3]The Erasmus programme is the largest international mobility programme in Europe, comprising more than 4,000 higher education institutions and 30 countries. The programme covers the travel and subsistence costs.

ity for self-realisation (looking for adventure and enjoyment) and to study in a world-class institution outside the UK (mainly prestigious universities in the United States).

Findlay et al. (2006) examined the changing mobility patterns, attitudes and behaviours of British higher education students who studied or worked abroad during their undergraduate degrees. They showed that students with a mother with a professional or managerial occupation, and with both parents with a higher education degree, were more likely to participate in an international mobility programme. Netz (2013) examined the factors that discourage undergraduate and master students from studying abroad in four European countries: Austria, Germany, Switzerland, and the Netherlands. The logistic regression results demonstrated that students who have a higher disposition to study abroad, measured by foreign language skills and parental educational attainment, were more likely to study abroad in all countries analysed, except in Austria. Salisbury et al. (2008) examined the factors that influenced the decision to study abroad among undergraduate students in the United States. The author showed, using logistic regression models, that students with parents with higher educational attainment, who were more interested in reading and more open to diversity, were more likely to plan to study abroad at the beginning of their freshman year.

Netz and Finger (2016) examined the changes in inequality in access to and within international mobility programmes during the expansion of higher education in Germany, using average marginal effects. The results showed that the

effect of parental education on likelihood of participating in international mobility increased between 1991 and 2003, but remained constant and significant after 2003. Therefore, the expansion of higher education in Germany did not increase the inequality in access to international mobility programmes. Regarding inequality within international mobility, the authors showed that the effect of parental education was significant when considering time spent abroad and likelihood of receiving a scholarship to study abroad.

Ramos (2009) examined an undergraduate exchange programme in a Brazilian university. The exchange mobility programme was created through bilateral agreements between the Federal University of Minas Gerais and foreign universities. The programme only covered tuition fees and allowed students to study for a semester in a foreign university. Linking the university's administrative data with the information on students who were accepted in the programme between 2008 and 2009, the author analysed the socioeconomic profile and school trajectories of the students participating in the programme. The descriptive statistics showed that students who pursued the exchange programme were mostly female, white, had both parents with a higher education degree and a high status occupation, and studied mainly in private schools during lower and upper secondary education. The students participating in the programme were therefore from a privileged academic and socioeconomic background when compared to students who did not participate in the programme and were enrolled in the same university. The author also performed 41 interviews to examine students' mobility

capital and motivation to participate in the programme. In the interviews, the exchange students reported being influenced by family international experiences and their own international experiences, through holiday travels or academic experiences. The majority of the students participating in the programme reported fluency in one or more foreign languages, having started foreign language classes at a very early age (around 11-12 years old). The students also described an interest in diversity and learning new cultures. Last, the students participating in the exchange mobility programme described two different motivations for pursing the international mobility: personal and/or professional development. The personal development comes from being exposed to a different culture and, in consequence, discovering their own identity. The professional development comes from gaining proficiency in a foreign language, developing an international network, and improving their curriculum.

Windle and Nogueira (2015) analysed the differences in the strategies for internationalization between economic and cultural elites in Brazil. The economic elite, represented by business owners, are aware of the importance of acquiring a cosmopolitan cultural capital, but, at the same time, demonstrate concerns about integrating their children in the family business. Therefore, short-term, non-educationally related and/or frequent travelling is the strategy used by this group. The cultural elite, represented by university professors, have strong attachment to cosmopolitan values and to the belief that education is a means to maintain their privilege. Therefore, they prefer long-term travel with educational

ends. However, both groups analysed recognize the benefits of having fluency in English in terms of reinforcing their social position and opening access to an international field of power. While the majority of the research showed that students from more advantageous socioeconomic backgrounds are more likely to pursue international education or international mobility, some studies demonstrate that international mobility might be considered an investment or a mechanism of upward mobility by the lower and middle classes.

Souto-Otero et al. (2013) examined financial issues and the socioeconomic background of the students participating in the Erasmus programme. The research showed that the majority of the students participating in the Erasmus programme have parents with higher-level occupations when compared with the general population, and the majority have at least one parent with a higher education degree. Moreover, the majority of students reported having an average or above average family income. However, the author observed some differences in students' socioeconomic background by GDP of country of origin. Students from a country with a high GDP (such as the Netherlands, UK, and France) tended to be from a more privileged socioeconomic background, while students from countries with lower GDP (such as Bulgaria, Hungary, and Romania) tended to be from a less privileged socioeconomic background. The author therefore argued that this difference might be explained by different motivations for mobility: in richer countries, mobility is pursued as a "consumption" item, while in poorer countries it is an "investment", which might improve students' prospects in the labour

market in their home country.

Weenink (2007) compares two types of Dutch secondary education: internationalised education (Dutch-English internationalised streams) and traditional elite education (gymnasium). Both types of education only admit students with high test scores and school recommendations. Furthermore, they represent only a small fraction of the students enrolled in secondary education (2.5 per cent for the traditional elite education and 0.5% for the internationalized education). The descriptive analyses demonstrate that students enrolled in a gymnasium tend to be from traditional upper classes (grandparents belonging to upper middle class) and tend to be more engaged in high-brow cultural practices. The logistic regression model confirms that students in the upper middle class are more likely to be enrolled in a gymnasium. Moreover, the author demonstrates that students enrolled in the internationalized educational stream have a similar social background to that of students enrolled in the regular pre-university stream. Thus, the author suggests that internationalisation is a strategy of upward social mobility rather than social reproduction.

Nogueira and Ramos (2014) analysed the exchange programme promoted by several South American universities: ESCALA. The ESCALA programme covers accommodation and provides a stipend, in addition to the tuition fees. Twenty-eight public universities in Argentina, Brazil, Bolivia, Chile, Paraguay, and Uruguay are part of the programme (p.98). Analysing students participating in the ESCALA programme who were enrolled in an undergraduate course at the Federal

University of Minas Gerais, the study showed a peak of students participating in the programme in 2009 (34 students) and a decrease in recent years (12 students in 2013). The author suggested that the increasing creation of undergraduate international mobility programmes to American and European universities, such as the SWB programme, might explain the decrease in the number of students participating in the ESCALA programme. Through interviews with 14 students who participated in the programme, the authors suggested that the ESCALA programme was seen as an opportunity for international mobility for students from less privileged socioeconomic backgrounds. Almost all students confirmed that they would not be able to study abroad during their undergraduate studies if they did not receive the economic support offered by the ESCALA programme. Interestingly, the students also reported that, if there were not any financial constraints, they would prefer to study in an American or European university.

The research on international mobility also analysed other factors that might influence students' decision to pursue international mobility. Brooks and Waters (2010), examining the motivation and experiences of British undergraduate or postgraduate students who pursue a higher education degree in a foreign country, showed that the decision to pursue a degree outside the home country was highly motivated by social relationships, such as family members, friends, and partners. The authors highlighted that the high value given to travel within certain groups is associated with family background: students whose families valued travel and had economic resources to fund it were more likely to establish links

with individuals with similar values. Findlay et al. (2017) showed that family and social institutions influence students' motivations and aspirations to study abroad. Through interviews with international students studying in the UK, the authors found that the family influence on post-study career trajectories varied accordingly to students' country of origin. For students from less economically advantaged countries, for example, study abroad represented a step to a lucrative international career, which might improve the economic prospects for the whole family. Moreover, the authors found that international mobility shaped students' life plans, producing new expectations for onward immigration and entering a global labour market. Netz (2013) showed that, in addition to social relationships, the financial burden caused by international mobility was also considered an important factor for students' decision to study abroad in Austria, Germany, Switzerland, and the Netherlands. Doyle et al. (2010), using an online survey, found that the cost cited was the main obstacle for participating in international mobility programmes during tertiary education among students from New Zealand. Other obstacles cited by the students were leaving family and friends and studying in a foreign language. Findlay et al. (2006) also found, throughout interviews with British higher education students, that financial and linguistic constraints were the two main barriers to international mobility. Presley et al. (2010), examining business students' attitudes toward study abroad programmes, found that, in addition to financial obstacles, academic concerns, such as lack of assistance in academic planning and availability of classes, were also mentioned

as factors that affected ability to study abroad by the students.

Because of a lack of longitudinal data on students who pursue international mobility during higher education, few studies show the socioeconomic returns (e.g.: labour market outcomes, occupation status, social class, etc.) from international mobility during higher education. Waibel and Ruger (2016), using data on German students, showed that international mobility was correlated with parental educational level and educational attainment, which are important predictors of occupational status. Still, the author found that international mobility may affect labour market outcomes for graduates from lower socioeconomic backgrounds, and have no effect for graduates from higher socioeconomic backgrounds. Di Petro (2015), examining Italian undergraduate students, showed that students who pursued international mobility during university were more likely to be employed three years after graduation when compared to students who did not pursue international mobility. Moreover, the author also found that students from disadvantaged socioeconomic backgrounds benefit more from international mobility when compared to students from privileged socioeconomic backgrounds. Therefore, students from lower socioeconomic backgrounds might benefit from international mobility since they can develop skills (such as foreign language skills, intercultural competence) that were not transmitted by their family.

2.2 Persistent Inequality

Current research on educational inequality examines the persistent influence of socioeconomic background on education transition. Shavit and Blossfeld (1993), in their book comparing education inequalities in thirteen countries, showed that the association between students' socioeconomic backgrounds and the likelihood of transitioning to higher levels of education had been maintained despite the expansion of the educational systems. They showed that students from more privileged socioeconomic backgrounds were more likely to transition to higher levels of education when compared to students from less privileged socioeconomic backgrounds. Breen et al. (2009) nevertheless showed that in some of the countries analysed by Shavit and Blossfeld social inequalities in education have maintained or decreased over time. Three theoretical approaches attempt to explain the persistent influence of socioeconomic background on educational transitions (Lucas and Beresford, 2010): Rational Action, Maximally Maintained Inequality, and Effectively Maintained Inequality.

2.2.1 The Educational Rational Action Theory

The Rational Action (RA) theory, proposed by Breen and Goldthorpe (1997), explain the persistence of the effect of socioeconomic background on educational transitions using a rational action approach. The authors created a mathematical model of educational decisions that could be applied to students' decisions throughout their educational trajectory. Students' educational decisions reflect

rational choices that are made calculating the costs and benefits of the available decisions. The decisions are dependent on constraints and opportunities available for students from different socioeconomic backgrounds. The mathematical model proposed by the RA, therefore, examines three factors that students consider when pursing an educational option: (1) the costs, (2) the likelihood of success, and (3) the value and utility attributed to this option by students and their families. By proposing a rational approach to educational decisions, Breen and Goldthorpe do not make any assumptions on cultural differences between social groups, deviating from the explanation of educational inequalities proposed by the reproduction theory.

The persistence of education inequalities across socioeconomic backgrounds is attributed to two primary effects: students from higher socioeconomic backgrounds have higher average abilities and higher levels of resources to meet the costs of education. Nevertheless, the authors presented three mechanisms, which they called secondary effects, which might explain the class differential in educational attainment: the relative risk aversion, differences in ability and expectation of success, and differences in resources. Through the relative risk aversion mechanism, families make educational decisions to ensure that their children "acquire a class position at least as advantageous as that from which they originate" (Chesters and Watson, 2013, p.201). In other words, educational choices are driven by the concern of downward mobility. Second, Breen and Goldthorpe reasoned that students must fulfil certain criteria to reach a certain level of education, such as

higher performance. Moreover, students' understanding of their own level of abilities shapes the individual's expectation of success. Because students from higher socioeconomic backgrounds have higher average abilities, and consequently higher expectations of success, they are more likely to pursue higher levels of education. Last, students from families with higher socioeconomic backgrounds have higher resources and, therefore, can afford to pursue higher levels of education.

When examining the persistent inequality after the expansion of education, the authors argued that the decrease in the relative cost of education in industrialised countries could explain the increase in the number of students from disadvantaged socioeconomic backgrounds continuing in education. The mathematical model, proposed by Breen and Goldthorpe, demonstrates that "(. . .) a uniform decline in the costs of education will result in the odds for children of all classes choosing to continue being multiplied by something like a common factor" (p.64), maintaining class differentials in education attainment. However, each social class has a different response to changes in the cost of education. For example, at the time of the decline in the cost of education, students from more privileged socioeconomic backgrounds would already have the resources to exceed the ordinary levels of education, and would tend to continue in higher levels of education. Netz (2013) and Netz and Finger (2016), in the studies discussed in the previous section, used the rational choice theory to explain the social selectivity of international mobility programmes by emphasising the differences in educational choices by different social classes. Netz (2013) considered the expected benefits and anticipated costs

of international mobility to understand why students from lower socioeconomic backgrounds were less likely to study abroad during the undergraduate and master programme in Austria, Germany, Switzerland, and the Netherlands. Netz and Finger (2016), using Germany as an example, showed how education choices might improve students' chances of studying abroad (e.g.: students from higher socioeconomic backgrounds chose educational tracks that emphasised proficiency in a foreign language). Moreover, in the case of the higher education expansion in Germany, the authors suggested that students from higher socioeconomic backgrounds would pursue international mobility to avoid downward mobility.

2.2.2 The Maximally Maintained Inequality and the Effectively Maintained Inequality Theories

The Maximally Maintained Inequality (MMI) theory, proposed by Raftery and Hout (1993), suggests that educational expansion can only reduce inequality when the enrolment rate for advantaged socioeconomic groups in certain levels of education reaches saturation point. Educational inequalities are maintained until less privileged socioeconomic groups increase their educational attainment rates as fast as more privileged socioeconomic groups. However, when advantaged socioeconomic groups are entirely enrolled in a certain level of education, further educational expansion would reduce educational inequality with regard to this level.

The Effectively Maintained Inequality theory, proposed by Lucas (2001) suggests

that the saturation of a certain level of education does not reduce educational inequalities. Analysing the educational trajectories of American students from upper secondary education to the transition to higher education, Lucas found an important effect of students' socioeconomic background on the curriculum choices and in the transition to higher education. The author showed that, even with the expansion of upper secondary education in the United States, students from more privileged socioeconomic backgrounds would choose more prestigious curriculum tracks compared with students from less privileged socioeconomic backgrounds. Therefore, the saturation of a level of education, such as upper secondary education, would not reduce education inequalities. Instead, the educational inequalities would be transposed to other domains.

Combining, therefore, the literature on education transitions and on educational tracking, the author considered two dimensions of educational inequalities: quantitative and qualitative. First, the socially privileged classes maintain their advantages through the assurance of certain advantaged levels of education. Nevertheless, if access to these previously exclusive levels of education is broadened, the socially privileged then seek advantages through qualitative differences, reaffirming their socioeconomic benefits and prestige. For example, if a larger share of high school graduates reached higher education, the effectively maintained inequality theory predicts that students from an advantaged socioeconomic background would gravitate towards more selective higher educational institutions (Alon, 2009). Even with the saturation of enrolment rates of privileged socioe-

conomic groups, the educational inequality would be sustained by qualitative differences.

Considering international mobility in a period of expansion of higher education, one could argue that the increasing demand by the middle and upper classes for the internationalisation of higher education is a strategy to maintain qualitative differences. Thereby, with the expansion of Brazilian public higher education, the classes that had previously secured their advantage through their exclusive education now seek internationalization of higher education as a strategy to maintain their social and economic advantage.

2.3 Research on Persistent Inequality

The Rational Action, Maximally Maintained Inequality and Effectively Maintained Inequality theories were used in several studies aiming to examine the effect of students' socioeconomic background on educational transition. These studies tried to understand the persistent inequality after a period of expansion of higher education in different contexts.

Chesters and Watson (2013) aimed to understand the persistence of educational inequality despite the expansion in higher education in Australia. Using the Maximally Maintained Inequality (MMI) and the Rational Action theory, the authors examined why students from higher socioeconomic backgrounds were more likely to attain a higher education degree in the country. For this study, the authors

used three nationally representative surveys: the 1987-1988 and the 1994 National Social Science Survey (NSSS), and the 2005 Neoliberalism, Inequality and Politics project. Only respondents more than 21 years old at the time of the survey were selected (N=4,464). In order to test the odds of students obtaining a higher education degree considering their parents' education in Australia, the author performed three logistic regression models, one for each year that the data were collected. The dependent variable comprised respondents with a higher education degree against respondents without a higher education degree. The model comprised two independent variables regarding parental education: fathers with a higher education degree against fathers without a higher education degree, and mothers with a higher education degree against mothers without a higher education degree. The model was also controlled by gender, type of school and birth cohort. The descriptive results demonstrated that parental education continued to predict a child's education, although there was a decline in the effect of having a father with a higher education degree throughout the years. The results demonstrated that students with parents with a higher education degree were more likely to obtain a higher education degree in Australia. The odds for students with a father with a higher education degree were 5.5 in 1987, 2.5 in 1994 and 2.7 in 2005. Moreover, the odds of obtaining a higher education degree increased for women over time. Women born after 1969 were five times more likely to obtain a higher education degree than women born before 1940 (p.208). According to the authors, these results supported both the MMI and RRA theo-

ries. Higher education still did not reach saturation point in Australia; therefore, inequality continued in this level of education. The increase in the odds of women obtaining a higher education degree represented a change in the path in which women secure their social position. Before 1940, women secured their position mainly through marriage. Consequently, women from high socioeconomic backgrounds did not need to pursue higher education in order to avoid downward social mobility. However, after 1969, the expansion of higher education provided an alternative path to secure social position, increasing the number of women obtaining a higher education degree.

Boliver (2011) and Iannelli, Gamoran, and Paterson (2011) examined educational inequalities regarding expansion policies in British Higher Education. These studies demonstrated that overall there was a decline in social inequality in the United Kingdom higher education enrolment. However, when considering qualitative differences in the British higher education system, the studies found a pattern that was consist with the EMI. Boliver analysed the British Household Panel Survey from 1991 to 2002, using three logistic regression models. The first regression model demonstrated that the association between students' socioeconomic background and likelihood of being enrolled in a higher education institution reduced after the expansion policies implemented in 1960. However, the two following logistic regression models demonstrated that the association between students' socioeconomic background and likelihood of enrolment on more prestigious courses (degree-level programme), and the likelihood of enrolment in higher

status higher education institutions ("old" universities) was maintained after the expansion of higher education (Boliver, 2011, p.240). Iannelli, Gamoran, and Paterson (2011) used the Scottish School Leavers Surveys to examine inequalities in Scottish higher education. The authors, first, performed a binary logistic regression model to predict the likelihood of entering higher education by students' socioeconomic background. The model showed that there was a decline in inequality in access to higher education in the country. After this, they performed multinomial models to examine the difference in educational inequalities by sector of higher education. The results showed that the effect of students' socioeconomic background remained high and stable for ancient universities, and dropped for polytechnics/new universities.

Ichou and Vallet (2011) examined the expansion of upper secondary education and the diversification of the diplomas (baccalaureate) at the end of this educational level in France. Using the EMI theory, the authors discussed how the expansion of upper secondary education in France coincided with the differentiation of the upper secondary school final examination. During the beginning of the 19th century, the baccalaureate was created for students enrolled in the elite lycées, planning to enter higher education. After two educational reforms, the technological and vocational baccalaureates were created, respectively in 1965 and 1985. The academic baccalaureates are a precondition to admission to University and comprises an educational hierarchy among its sub-types. The technological baccalaureate prepares students for the labour market and is a precondition to admission to vo-

cational tertiary education. Last, the vocation baccalaureate prepares students for the labour market. The authors used four longitudinal datasets, which cover the period from the 1960s until 2006. The datasets contained information on participants' social class background and educational attainment. Furthermore, the dataset allowed them to differentiate between up to seven types of baccalaureate (the academic baccalaureates: mathematics scientific, physics-centred scientific, other scientific, economics/sociology, literature, and the technological and vocational baccalaureate). The authors used log-linear and log-multiplicative models to analyse the odds of students from different social classes obtaining a baccalaureate. Through a unidiff model, they demonstrated that the class inequality in obtaining a baccalaureate decreased since the 1960s. However, using a constant association model, the authors showed that, when considering the type of baccalaureate, class inequality remained stable over time, supporting the EMI theory.

Ayalon and Shavit (2004) analysed the hypothesis in the MMI and EMI theories regarding the Israeli educational context. Israeli upper secondary education entails two main tracks: academic and vocational. The first prepares students for the university matriculation examinations, leading to a plain or university-qualifying bagrut diploma, and the second prepares students for the labour market. The bagrut diploma is a precondition to tertiary education enrolment and it is strongly associated with socioeconomic and ethnic positions. In the 1990s, the Israeli Ministry of Education implemented educational policies aiming to raise

diploma eligibility rates. The reforms were intended to reduce the number of requirements for the examinations and to reduce the curricular distinction between the academic and vocational tracks. The authors examined the effect of these educational policies in reducing socioeconomic, sex and ethnic inequalities. The research sample comprises 20-percent of Israeli native young adults, between 16-21 years old, who participated in the 1995 Israeli and Population Housing Census. The dependent variable of the study was type of bagrut (not eligible, eligible for a plain bagrut, and eligible for a university-qualifying bagrut) and the independent variables were cohort (before and after the educational policy), sex, ethnicity, parental education, economic circumstances, and track (type of secondary education). According to the MMI hypothesis, raising diploma eligibility rates would raise matriculation of all ethnic and social groups; however, it would maintain inequality, once this level did not reach saturation. The descriptive analysis results demonstrated that there was an increase in bagrut eligibility (plain or academic-qualifying) for all ethnic groups and social groups after the implementation of the policy. However, the eligibility for the academic-qualifying bagrut for Arabs did not increase at the same pace as for Jews. After this, the authors performed a multinomial logit regression model to test the likelihood of obtaining a plain or an academic-qualifying bagrut compared with students who did not obtain a bagrut. This model aimed to test whether the selectivity of the academic-qualifying bagrut increased and the selectivity of the plain diploma decreased after the implementation of the educational reforms, following the EMI

hypothesis of qualitative differences. The models' estimate confirmed that the effect of the socioeconomic and ethnic characteristics on the odds of obtaining a plain bagrut decreased. The models also confirmed that the effect of socioeconomic and ethnic characteristics on the odds of obtaining an academic-qualifying bagrut remained stable through the cohorts. Therefore, the results of this were consistent with the EMI hypothesis of persistence of qualitative differences after expansion of the educational system, maintaining the inequality of educational opportunities.

The research on persistent inequality, performed in industrialised countries, mainly focused on two explanations for the changes in education stratification: educational reforms, and change in the demand for a certain level of education. Following this, the few researches examining the effect of educational expansion and educational inequalities considering the Latin American and, more specifically, the Brazilian context are presented. These researches bring a new aspect that might affect the inequalities of education opportunities: the macroeconomic context.

Torche (2010) examined the trends in inequality of educational opportunities in the Latin American context by comparing four countries: Brazil, Chile, Colombia, and Mexico. The author aimed to analyse how the economic recession, which hit the region during the 1980s, affected educational inequalities across socioeconomic groups. The analysis used the 1996/97 Survey of Living Conditions dataset for Brazil (N=5,451), the 2001 Social Mobility Survey for Chile (N=2,970), the

2003 National Life Quality Survey for Colombia (N=24,110), and the 2006 Social Mobility Survey for Mexico. These datasets are nationally representative, fully probabilistic, and comprised comparable socioeconomic variables. The author examined the likelihood of transitioning to four different levels of education of four different cohorts: born between 1940 and 1948, 1949 and 1957, 1958 and 1966, and 1967 and 1975. The last two cohorts experienced their educational careers during the economic crisis. The educational transitions analysed were completing primary, entering secondary, completing secondary, and entering postsecondary education. Ordered logistic regressions of the highest educational level attained by socioeconomic background were performed for each country, with indicator variables for the cohorts. Socioeconomic background was measured using father's education, mother's education, father's occupational status, and gender. The author found a similar trend in the four countries: equalization in completing primary and entering secondary school for all cohorts. However, for the last two cohorts, which endured the economic recession, the author found an increased inequality in completing secondary and entering postsecondary. The results suggested that the increase in the inequality resulted from the decrease in the demand for these levels of education by students from lower socioeconomic backgrounds. The changes in the macroeconomic context, therefore, reduced the likelihood of families from lower socioeconomic backgrounds maintaining their children in higher educational levels, increasing educational inequalities.

Do Valle Silva (2003) examined the association between students' socioeconomic

background and educational transitions, taking into account the steady expansion of the Brazilian education system which occurred between 1981 and 1999. The author analysed three educational transitions: finished first grade of primary education, finished primary education, and finished lower secondary education. Using the National Survey for Household Sample (PNAD) for 1981, 1990 and 1999, the author estimated the likelihood of the three educational transitions, considering variables for gender, ethnicity, age, education of the head of the family, family per capita income, indicator variable for having a female as head of family, number of children in the household, indicator variable for individuals living in urban areas, and region of the country. The author showed that, at the lowest level of transition in the education system (finishing first grade in primary education), the rate of success was almost universal: virtually all Brazilian students finished this level of education, independently of their socioeconomic background in 1990 and 1999. On the other hand, the effect of students' socioeconomic background on the probability of transitioning to higher levels of education (finishing primary education and finishing upper secondary education) was maintained or increased, suggesting a displacement of inequalities to other educational levels. Moreover, the inequality in the transition was higher for individuals who self-declared as being mixed-race or black. Therefore, the main beneficiaries of Brazilian educational expansion were groups who already had some relative advantages: females and students who lived in the Southeast region of the country[4]

[4]Brazil is divided in five official regions: North, Northeast, Midwest, Southeast, and South. The Southeast is the region with the highest number of inhabitants, and has the highest GDP (around 55.41 per cent of the country's total GDP) (IBGE, 2012).

Marteleto, Carvalhaes and Hubert (2012) examined inequalities in educational opportunities in secondary schools in Brazil and Mexico. The research analysed the changes in educational inequality for Brazilian and Mexican teenager cohorts in three different periods: the 1980s, a period of economic recession; the 1990s, a period of structural changes; and the 2000s, a period of economic growth. The two countries analysed recently reached universal access to secondary education through educational reforms. Testing the MMI theory, the authors first examined whether the universalisation of primary and secondary education reduced the association between social origin and educational transition. After, testing the EMI theory, the authors analysed the association between social origin and enrolment in private education. The authors used the data from the national representative household surveys (1982, 1992, and 2007 for Brazil, and 1984, 1992 and 2008 for Mexico). The sample comprised teenagers between 15 and 18 years old (age of transition to secondary education) who lived with their mothers. Logistic regression models were performed to analyse the likelihood of finishing primary education, entering secondary education and enrolling in private education for each year cohort in Brazil and Mexico. The models were controlled by gender, age, mother schooling, household structure, household income, urbanisation, and region of the country. After this, the differences in the coefficients for each year cohort were compared. In this study, private education was seen as a proxy for educational quality in Brazil and in Mexico, which was justified by the differences on PISA score for students in private and in public schools. However, the authors

did not discuss the quality differences within the private system in both countries. The logistic regression estimates demonstrated that the association between social origin and the likelihood of finishing primary education decreased between 1980 and 2000 in both countries. Nevertheless, the association between social origin and the likelihood of entering secondary education remained constant in Brazil and reduced in Mexico. Lastly, the authors found a significant increase in the association between social origin and private school enrolment. This result suggested that, despite the decrease in the association between social inequality and access to education, there was an increase in the association between social origin and educational quality, which is consistent with the EMI theory of qualitative difference in educational inequality.

2.4 Hypotheses

Following the literature presented above, two hypotheses were raised to answer the first research question, which examines the effect of students' socioeconomic backgrounds on the likelihood of participating in the SWB programme. The literature on international mobility on education in higher education showed that students' socioeconomic backgrounds are an important predictor of likelihood of participating in an international mobility programme during higher education (Findlay et al., 2006; Netz, 2013; Netz and Finger, 2016; Salisbury et al., 2008). However, some studies also showed that students from less privileged socioeconomic backgrounds might pursue international mobility depending on whether

they are from a country with lower GDP (Souto-Otero et al., 2013), whether the international mobility programme offers a financial bursary (Nogueira and Ramos, 2014), or whether the student or their family sees international mobility as an "alternative road to upper middle-class position for social climber" (Weenink, 2007, p. 505). Following these studies, the first hypothesis in the PhD research examines whether the internationalisation exemplifies a mechanism for opening opportunities in the educational system. Therefore, after the expansion of higher education, students from lower socioeconomic backgrounds have a higher motivation to participate in the SWB programme, which offers funded places to study abroad, and seek international mobility as a strategy for upward mobility.

The literature on persistent inequality demonstrated that educational inequalities remain after the expansion of education in different countries. These studies showed that education inequalities are transferred to other domains after the expansion of education, such as differentiation of diplomas, tracks, and/or type of higher education institution. The RA theory and the EMI theory tried to explain why students from more advantageous socioeconomic backgrounds are more likely to pursue distinct education trajectories to avoid downward mobility, as phrased by the RA, or to maintain their social and economic prestige through qualitative differences, as phrased by the EMI. Therefore, following these theories, the second hypothesis investigates whether the increasing demand by middle and upper classes for international mobility might be, therefore, a strategy for maintaining education inequalities. With the expansion of Brazilian higher education,

the classes that had previously secured their advantage through the assurance of high levels of education now seek international mobility as a strategy for maintaining educational inequalities. Therefore, students from a more advantageous socioeconomic background would be more likely to participate in the SWB programme.

Considering the research on international mobility, another hypothesis was raised to answer the second research question, which analyses the impact of students' socioeconomic background on the prestige of the university of destination during the SWB programme. When analysing international mobility among German undergraduate students, Netz and Finger (2016) demonstrated that students from more advantageous socioeconomic backgrounds were more likely to pursue more exclusive types of education. Therefore, the second hypothesis tested whether the students from more privileged backgrounds studied in more prestigious universities during the SWB programme compared with students from less privileged socioeconomic backgrounds.

Chapter 3

3 Background

As discussed in the introduction to this thesis, in the mid 1990s, Brazil achieved economic stability after a long period of deep economic recession (Torche and Costa-Ribeiro, 2012). Economic stability and educational reforms led to the rapid improvement of education in the country (Guimaraes de Castro, 2012; OECD, 2013; Rosati, 2011). In the last twenty years, Brazil achieved universal coverage and increased enrolment in primary education. Educational attainment also had the largest increase in the world, from 3.8 to 7.2 years of schooling from 1990 to 2010 (Bruns et al. 2012). As discussed in the literature review, do Valle Silva (2003) and Martelo, Carvalhaes and Hubert (2012) examined the association between students' socioeconomic background and educational transitions between the 1980s, a period of economic crisis, and the 2000s, a period of economic growth. Both studies showed that the effect of students' socioeconomic background on the likelihood of lower levels of education decreased significantly. Nevertheless, the effect of students' socioeconomic background on the likelihood of transitioning to the secondary levels of education was maintained or increased. As do Vale Silva (2003) suggested, the main beneficiaries of Brazilian educational expansion were groups who already had some relative advantages. Martelo, Carvalhaes and Hubert (2012) demonstrated an increase in the association between students'

socioeconomic background and enrolment in private education, suggesting a displacement of educational inequalities to qualitative differences.

Therefore, despite the improvement in the last twenty years, Brazil's persistent educational inequality is still reflected in the school career of Brazilian students, producing what is called the virtuous and vicious cycles. In the first one, students from privileged socioeconomic backgrounds receive their entire education in high quality private schools and, later, attend higher education in prestigious public and free higher education institutions. In the second cycle, students from underprivileged socioeconomic background receive their education in under-invested public schools, and afterwards enter low quality private higher education institutions or do not seek higher education.

This chapter examines the educational policies that helped improve the education in the country. First, the educational finance reform, the implementation of an educational measurement system, and the conditional cash transfer programmes are discussed. These policies aimed to reduce the association between education and social inequalities in basic education (from primary to upper secondary education). Second, the affirmative action and expansion policies in Brazilian public higher education are described. Finally, the SWB programme, which is the policy analysed in this thesis, is presented.

3.1 Brazilian Educational System

Brazil's current educational system is divided into *educação básica*, *ensino superior*, and *ensino técnico*. The *educação básica* comprises childhood education, *ensino fundamental I* (primary education), *ensino fundamental II* (lower secondary education), and *ensino médio* (upper secondary education). The *ensino superior* (higher education) includes the undergraduate and graduate education. Finally, the *ensino técnico* (vocational school) is divided into three different types: *integrado*, *concomitante*, and *subsequencial*. In the *integrado* (integrated), students complete the vocational education together with the upper secondary education in the same institution. In the *concomitante* (concomitant), students complete the vocational education together with the upper secondary education in different institutions. Last, in the *subsequencial* (sub-sequential), students pursue the vocational education after completing the upper secondary education. Table 1 shows the division of the *educação básica* and *ensino superior* by general programme, programme, year, and students' expected age in the programme. From 2010, the *ensino fundamental* was the only compulsory level of education in the country. However, the 59th Constitutional Amendment established that, additionally to the *ensino fundamental*, preschool and *ensino médio* should also be compulsory in the country starting in 2016. Compulsory education, therefore, went from nine years to 14 years of schooling.

The Constitution of 1988 defined that the three levels of governments should be responsible for administrating education in the country. The municipalities

Table 1: Structure of the Brazilian Educational System.

Level	General Programme	Programme	Year	Age
Educação Básica Basic Education	Childhood Education	Day Care	-	0-3
		Preschool	-	4-5
	Ensino Fundamental	*Ensino Fundamental I* Primary Education	1st	6
			2nd	7
			3rd	8
			4th	9
			5th	10
		Ensino Fundamental II Lower Secondary Education	6th	11
			7th	12
			8th	13
			9th	14
	Ensino Médio	Upper Secondary Education	1th	15
			2nd	16
			3rd	17
Ensino Superior Higher Education	Undergraduate	Bachelor	-	18+
		Licenciatura	-	
		Technological	-	
	Graduate	Specialisation	-	-
		MBA	-	-
		Master	-	-
		PhD	-	-

Source: Information retrieved from the Federal Government's website on 6th December 2016: http://www.brasil.gov.br/educacao/2014/05/saiba-como-e-a-divisao-do-sistema-de-educacao-brasileiro/view

are the main ones responsible for providing childhood education (day care and preschool), and *ensino fundamental* (primary and lower secondary education). The states should prioritise the *ensino médio* (upper secondary education), but can also help in providing the *ensino fundamental*. The federal government is responsible for organising the educational system and for regulating the *ensino superior* (higher education).

Another important aspect of Brazilian education is the difference between public and private education in basic education and in higher education. The public education is provided by the federal, state or municipal governments and does not

have any tuition fees. The private education is provided by the private sector and charges tuition fees. In the *educação básica*, despite the diversity in the private sector, the quality of the education offered in private schools tends to be much higher than in public schools, with the exception of federal public schools (Sampaio and Guimarães, 2009). In higher education, however, the quality of the education offered in the public higher education institutions tends to be much higher when compared to the private higher education institutions (Catani et al., 2006). Therefore, on one hand, students from lower socioeconomic backgrounds attend public school during the *educação básica* and then tend to enter private higher education institutions or do not seek higher education at all. On the other hand, students from higher socioeconomic backgrounds tend to follow the opposite pattern: attend private schools during the *educação básica*, and afterwards enter public higher education institutions (Torche and Costa-Ribeiro, 2012). Table 2 shows the basic statistics regarding the level of education in Brazil by provider. According to the 2012 School Census (INEP, 2013a), around 71 per cent of the students in early childhood education were enrolled in a municipal school, while around 85 per cent of students in upper secondary education were enrolled in a state school. However, despite the high percentage of students in public schools during the upper secondary education, around 73 per cent of the students were enrolled in a private higher education institution (INEP, 2013b).

Table 2: Basic Statistics on Brazilian Education System.

Level	Provider	Number of Institutions	Number of Students	Percentage of Students
Early Childhood	Federal	24	2,554	0.04%
	State	1,123	57,825	0.79%
	Municipal	85,424	5,129,749	**70.31%**
	Private	29,996	2,105,384	28.86%
	Total	116,567	7,295,512	100.00%
Ensino Fundamental (Primary & Lower Secondary)	Federal	46	24,704	0.08%
	State	25,749	9,083,704	**30.59%**
	Municipal	96,921	16,323,158	**54.95%**
	Private	21,989	4,270,932	14.38%
	Total	144,705	29,702,498	100.00%
Ensino Médio (Upper Secondary)	Federal	364	126,723	1.51%
	State	18,523	7,111,741	**84.90%**
	Municipal	392	72,225	0.86%
	Private	7,885	1,066,163	12.73%
	Total	27,164	8,376,852	100.00%
Higher Education	Federal	103	1,087,413	15.45%
	State	116	625,283	8.89%
	Municipal	85	184,680	2.62%
	Private	2,112	5,140,312	**73.04%**
	Total	2,416	7,037,688	100.00%

Source: INEP, Technical Summary of the 2012 School Census, and of the 2012 Higher Education Census.

3.2 Educational Reforms

The educational reforms in Brazilian education intensified in 1995, with the appointment of Fernando Henrique Cardoso, a member of the centre Brazilian Social Democracy Party, in the presidential election. During his eight years as president, Cardoso strengthened the role of the Ministry of Education and defined three critical areas for improvement, which according to the World Bank have been on par with global best practice, and their implementation has been sustained and effective (Burns et al., 2012). They are: education finance reform, a results measurement system, and conditional cash transfer programs. Further-

more, the Cardoso administration created The National Basic Education Law, which defined and regulated the Brazilian educational system, and created the first national curriculum guidelines (Pinto, 2002). Luiz Inácio Lula da Silva and Dilma Rousseff, members of the Workers' Party, were elected presidents, respectively, in 2003 and 2011. Lula da Silva and Dilma Rousseff's governments reinforced and expanded Cardoso's educational policies.

3.2.1 Education Finance Reform

As stated in the previous section, the Constitution of 1988 divided the educational administrative responsibilities between the three level of governments. Furthermore, the Constitution established that the states and municipal governments had to spend at least 25 per cent of their tax and transfer revenues on education, while the federal government had to spend 18 per cent. However, in dividing administrative and financial responsibilities, the Constitution did not consider the enormous inequality within regions in Brazil (Menezes-Filho and Pazello, 2007). Thus, while the spending per primary student in the northeast of the country was equal to R$100 per year (less than Nicaragua and Bolivia), in the southeast municipal and state schools spent R$1,500 (Brazilian Real) per year (same as Rep. Korea and Singapore) (Burns et al., 2012).

In 1998, the Cardoso administration implemented an educational fund aiming for a more equitable distribution of state and municipal tax funds. The fund, named FUNDEF (Fund of Maintenance and Development of the Elementary Educa-

tion and Enhancement of Teaching), guaranteed a national minimum spending per student in the *ensino fundamental* (primary and lower secondary education). The FUNDEF was a federal managed fund which redistributed resources among municipalities and states. Through the fund, the federal government was also responsible for completing the spending in jurisdictions that could not afford the national minimum spending per student (de Mello and Hope, 2005). The fund established that at least 60 percent of the allocations must be spent on teachers' wages and the remaining 40 percent on schools' maintenance and operations. In 2007, Lula da Silva's administration expanded FUNDEF to early childhood education and upper secondary education and renamed it to FUNDEB (Fund of Maintenance and Development of the Basic Education and Enhancement of Educational Professionals). Moreover, FUNDEB guaranteed a minimum spending per student in educational programmes for indigenous and quilombolas communities[5], and youth and adult education[6].

Analysing 1991-2002 state and municipality-level data, de Mello and Hope (2005) showed that the implementation of FUNDEF in 1998 was important to increase the enrolment rates in primary and lower secondary education, using OLS regression models. Moreover, the municipality-level model showed that the FUNDEF was important in increasing the enrolment rates in small municipalities. Gordon and Vegas (2004) using panel data on education indicators and financial data on

[5]The quilombolas communities are settlements founded by descendants of Afro-Brazilian slaves.

[6]The youth and adult education offers the *educação básica* in public schools for people who did not attend this level of education at the expected age.

the FUNDEF for all municipalities and states in the country between 1996 and 2002, demonstrated that the fund had a greater effect on enrolment rates in municipalities that were spending, before the financial reform, less than the national minimum. The authors, using student achievement data, also showed that the fund had a positive effect on students' test scores for non-white and low-achiever students. Menezes-Filho and Pazello (2007), using difference in difference methods, demonstrated that the raise in teachers' wages guaranteed by the FUNDEF increased students' test scores.

3.2.2 Measurement System

The system for measuring educational results was also progressively developed by the Cardoso and Lula da Silva administrations. The Brazilian measurement system is administrated by the INEP (National Institute for Educational Studies and Research), a federal agency associated with the Ministry of Education. Three exams were created to evaluate the following three levels of education: the primary and lower secondary, the upper secondary and higher education.

In 1995, Brazil restructured the sample-based evaluation system for the *educação básica*, named SAEB (Evaluation System of Basic Education). A sample of nationally represented students in public and private schools during their last year of the *ensino fundamental I* (primary education), the *ensino fundamental II* (lower secondary education), and the *ensino médio* (upper secondary education) take biennial tests in math and Portuguese. The aim of the SAEB is to produce a diag-

nostic of the Brazilian educational system. The test is developed using the Item Response Theory (IRT), which allows for comparing the results between years (INEP, 2017a). In 2005, Lula's government created the *Prova Brasil*. The *Prova Brasil* uses the same methodology of the SAEB to evaluate students in their last year of primary and upper secondary education in math and Portuguese (INEP, 2017b). Nevertheless, while the SAEB is performed by a nationally representative sample of students in private and public schools, the *Prova Brasil* is performed by all students in public schools. In addition to measuring attainment, the SAEB and *Prova Brasil* requires that the students participating in the exam complete a socioeconomic questionnaire, which allows further research on the Brazilian education system. With the combined results of the SAEB, *Prova Brasil* and the School Census, the Ministry of Education created a Basic Education Development Index (IDEB), which comprises students' performance in both exams and schools' pass rate. The IDEB is available from the country to the school level (INEP, 2017c).

The Brazilian National Secondary School Exam (ENEM) was created in 1998 with the purpose to evaluate upper secondary school quality in the country. In 1998, approximately 157,000 students participated in the test. In 2016, more than eight million students performed the test. The ENEM datasets were used to examine the association between social inequality and international mobility among Brazilian undergraduate students. Therefore, the ENEM is extensively described in the data chapter of this thesis.

Last, the Cardoso administration created the National Exam of Programmes (*Provão*) in 1996 with the purpose of evaluating the Brazilian higher education system. The expansion of higher education in Brazil occurred mainly through outsourcing this level of education to the private sector (Carnoy et al., 2013). Thus, the implementation of the test was considered a mechanism for quality control for higher education institutions in the country (Verhine et al., 2006). Programmes that did not reach a minimum standard in the test were closed by the Ministry of Education. In 2004, the Ministry of Education replaced *Provão* with The Higher Education National Exam (ENADE). Each year the ENADE has evaluated different undergraduate programmes (INEP, 2017d). A sample of students in their first and last year of the program evaluated takes the test. Apart from estimating learning gains in general and specific academic skills, the ENADE also requires that the students complete a socioeconomic questionnaire.

3.2.3 Conditional Cash Transfers Programmes

In 2001, the Cardoso administration initiated a conditional cash transfer programme with the purpose of reducing school evasion and child labour, and, consequently, increasing school attainment in the country. The programme, named *Bolsa Escola* (School Scholarship), provided financial aid to poor families with children between six and fifteen years old attending schools. Thus, families with an income inferior to R$90 and with children enrolled in school received a scholarship of R$15 per child. These scholarships were deposited in a National Bank

account in the name of the mother of the children. The *Bolsa Escola* was part of a trend in Latin American educational policies which pursued reducing poverty in the short and long term. This anti-poverty educational agenda was highly widespread by international organizations, such as the World Bank (Clemente, 2007).

Ferro and Kassouf (2005), using the micro data of the 2001 National Household Sample Survey (PNAD), examined the impact of the *Bolsa Escola* on child labour. The probit model demonstrated that the implementation of the programme did not reduce the likelihood of children entering the labour market. However, the OLS regression showed that children who participated in the programme worked around three hours less per week when compared to children who did not participate in the programme. Bourguignon et al. (2003), using a micro-simulation approach, assessed behavioural response to the *Bolsa Escola*. The authors showed that about one third of children between 10 to 15 years old, who were not enrolled in school before, enrolled after the implementation of the programme. In the poorest households the effect was even higher; one half of the children in this age group enrolled in response to the programme.

In 2003, Lula da Silva's administration unified the four existent federal conditional cash transfer programmes in the country - *Bolsa Escola*, *Bolsa Alimentação*, *Auxo Gás* and *Programa Nacional de Acesso à Alimentação* -, creating the *Bolsa Família* (Family Scholarship), which became the largest conditional cash transfer programme in Latin America (Soares, 2012a). In 2012, it was estimated that one

in every four families in the country benefited from the programme (Soares et al, 2010). In 2010, "families whose per capita income is less than to R$140 receive R$22 for each child aged 14 or younger, up to a maximum of three children per family, and another R$33 for each teenager aged 15 to 16, up to a maximum of two per family. Additionally, families whose per capita income is below R$70 receive another R$68, independently of household composition" (idem, p. 2). To receive the benefit, families must have their children enrolled in school, attend regular health checks, and have their children immunised on schedule (Soares, 2012a).

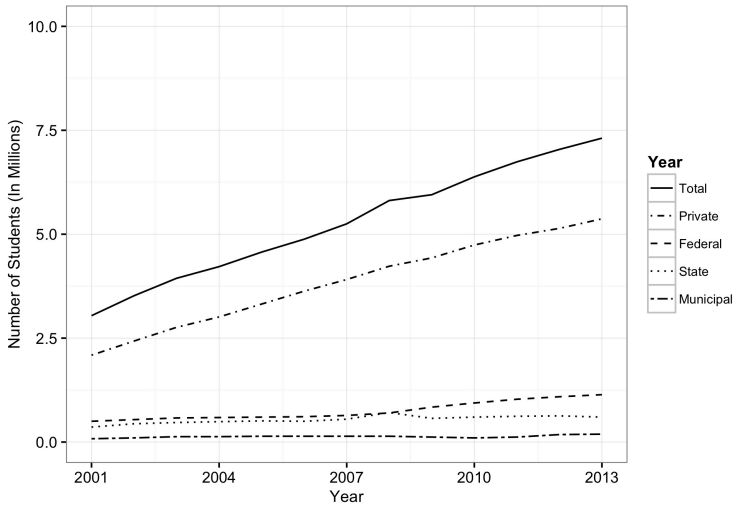
A large number of studies analysed the impact of *Bolsa Família* on social inequality, poverty, schooling, nutrition, work, fertility, citizenship, gender roles, and voting, among others. Several studies demonstrated that *Bolsa Família* had contributed to the reduction of social inequality in the country (for example, Paes de Barros et al., 2007; Hoffman, 2010; Soares et al. 2010). However, the effect of *Bolsa Família* on reducing social inequalities varies significantly according to each study. Regarding the impact on schooling, Silveria Neto (2010) estimated the impact of *Bolsa Família* on school attendance among children between 7 and 14 years old. Using propensity score matching, the author selected students with similar socioeconomic characteristics who were benefited and who were not benefited by the programme. The research showed that the programme has a positive impact on school attendance for children benefited by the programme. Moreover, the study showed that children from more disadvantageous socioeconomic

backgrounds (non-white, with parents with lower levels of education, lower family income, and in rural areas of the country) were more likely to be benefited by the programme. Glewwe and Kassouf (2012), using census data, demonstrated that the *Bolsa Escola* and *Bolsa Família* increased enrolment and grade promotion, and reduced dropping-out rates through multilevel regression models. Moreover, the authors discussed the impact of both conditional cash transfer programmes on equalizing enrolment by race.

3.3 Brazilian Higher Education

The economic stability reached in the mid 1990s also had a significant impact on the Higher Education in the country. In addition to the increase in educational attainment in basic education in the country, there was a growth in job offers and employment opportunities in the country, which increased the demand for high-qualified employees (Schwartzman, 2012). The demand for higher education by the lower and middle class in Brazil, therefore, increased greatly (Durham, 2004). The higher education expansion in the country was driven by the private sector (Carnoy, 2013). Figure 2 shows the number of students enrolled in a higher education institution by provider between 2001 and 2013. The number of students enrolled in a private higher education institution increased substantially in the period, while the number of students in a public higher education institution did not change much.

The public, free, higher education institutions, therefore, continued to be reserved



Source: INEP (2009, 2013) Techincal Summary of the 2009 and 2013 Higher Education Census.

Figure 2: Number of Students Enrolled in a Higher Education Institution by Provider, 2001-2013.

for students from privileged social groups. As can be seen in table 3, private higher education institutions have a higher number of places when compared to public higher education institutions, independently of the time of the day in which the course is offered. However, the number of candidates is much higher for public higher education institutions. For courses that are offered during the whole day in the public higher education institutions there were around 15.8 candidates per place in 2012, while for the private higher education institutions there were around 14.3 candidates per place. For courses offered at night, the difference was even higher: around 9.7 candidates per place in public and 1.5 candidates in private higher education institutions.

Studies have examined how the Brazilian higher education system favours students with higher socioeconomic profiles. They demonstrated that that students' socioeconomic characteristics, such as type of school during the *educação básica*,

Table 3: Average Number of Places and Candidates for Face-to-face Undergraduate Courses in 2012 by Administrative Type, According to the Time of the Day in Which the Course Is Offered.

	Time of the Day	Public	Private
Places	Whole Day	45.6	73.1
	Morning	34.9	84.6
	Afternoon	36.9	63.3
	Night	45.3	103.5
Candidates	Whole Day	720.4	510.4
	Morning	397.2	111.4
	Afternoon	409.7	102.3
	Night	440.9	151.5

Source: INEP, Technical Summary of the 2012 Higher Education Census.

parental education, and family income, are associated with success in the prestigious public university admission exam (Borges and Carnielli, 2005; Braga and Peixoto, 2006; Dias et al., 2008; Lopes et al., 2007).

In order to transform this structure, the Brazilian government and the federal universities sought to implement educational policies intended to expand access to public higher education. In what follows, the affirmative action and expansion policies are discussed. As public policies to expand access to underrepresented groups in public higher education are relatively new, there have been few research studies designed to examine their impact on Brazilian educational inequality.

3.3.1 Affirmative Action Policies

Starting in 2001, Brazilian public universities began expanding access for previously disadvantaged working-class students through racial, economic, and social

affirmative action policies[7]. Pervasive educational inequality has led to the creation of several movements demanding access to Brazilian public higher education institutions for underrepresented groups. The implementation of affirmative action policies in Brazil was highly decentralized. Each university had the authority to designate the procedures and characteristics of its affirmative action policy, which might be in the form of a quota system or a bonus system. Under a quota system, a percentage of places in the university were reserved for students from certain racial and socioeconomic groups. Under the bonus system, students from particular racial, ethnic, and socioeconomic groups were allocated extra points in the university admission exam (Feres Junior and Zoninsein, 2008).

The first prestigious public institutions to introduce affirmative action policies for black,*pardo* (mixed-race), and indigenous students included the University of Brasilia, State universities in Rio de Janeiro and Bahia, and the Federal University of Minas Gerais (Schwartzman, 2004). Because of intense public scrutiny, affirmative action policies were adapted to take into consideration students' family income. These criteria served as a substitute for or were used in combination with racial criteria during the admissions process to public universities, and were intended to benefit low-income students. Among the sixteen universities that first implemented racial affirmative action policies, fourteen began using socioeconomic criteria to complement racial criteria (Silva, 2006).

[7]An analogous, but more extensive, literature review on affirmative action policies in Brazil was presented in my Master Degree dissertation and published in the paper "Affirmative action in Brazil: how students' field of study choice reproduces social inequalities" in Studies in Higher Education (Dias Lopes, 2016).

Current research focuses predominantly on analysing the consequences of affirmative action in higher education on the socioeconomic profile of Brazilian public universities and its consequences in academic performance. However, there are mixed findings among the few existing studies concerning this topic. Velloso (2009) conducted research looking at the academic performance of the first cohort of students admitted through quotas at the University of Brasília, finding that students who entered the university through the quota system attained a similar grade point average (GPA) to those who entered through the traditional selection test. Waltenberg and Carvalho (2012) examined affirmative action students' performance in the Higher Education National Exam (ENADE) in 2008. Senior affirmative action students have, on average, a score four points below senior non-affirmative action students. According to the authors, despite their success in diversifying students in public higher education, affirmative action policies negatively affect the quality of prestigious higher education institutions in Brazil. Aranha et al. (2012) performed a quantitative study of affirmative action in the University of Minas Gerais (UFMG), one of the most prestigious public universities in the country. Using socioeconomic data on UFMG students enrolled between 2000 and 2012, the authors demonstrated that there was an increase in the number of black and mixed-race students following the implementation of bonus policies. In addition, the authors highlighted the growth in the number of black students enrolled after the implementation of affirmative action policies in the university. However, despite this increase, black and mixed-race students at

UFMG were still underrepresented when compared to the relative size of the black and mixed-race population in the state where the university is located.

3.3.2 Expansion Policies

The expansion of Brazilian federal universities started in 2007 with the implementation of the REUNI (Federal Universities Expansion and Restructure). The REUNI aimed to increase drastically the number of places in federal universities, and, consequently, expand access for previously disadvantaged working-class students, through the better use of the existing physical structure and human resources of the federal universities. Moreover, the REUNI intended to reduce dropout rates in higher education, which were equal to 40 per cent in the year of the programme implementation. The programme prioritised the creation of undergraduate programmes in the night shift, allowing working students to pursue higher education. Additionally, the REUNI created universities in less developed regions of the country.

The proposal for the REUNI was presented to all Brazilian federal universities, who had the autonomy to decide whether they would participate or not, and how they would implement it. All federal higher education institutions decided to participate in the programme. Following this, the universities presented the project detailing how they were going to increase the number of students to the Ministry of Education. The universities received an additional sum equal to 20 per cent of their budget. However, the monies were conditionally released with

the achievement of prescribed goals. Several opinionated articles questioned the implementation of REUNI (e.g.: Bessa Léda and Macebo, 2009; Costa et al., 2013). Some highlighted the danger of prioritising expansion over the quality of education. Others discussed the selection of new professors and the working conditions. Many of the articles wrote about how REUNI enclosed strong political ideologies. Yet few studies focused on understanding the effects of the programme in the federal universities.

3.4 Science Without Border Programme

The SWB programme aimed to create international cooperation in science and technology through the engagement of Brazilian higher education students and researchers in international education. Implemented in 2011, the programme expected to award 101,000 scholarships between 2011 and 2015 for Brazilian undergraduate and graduate students and researchers[8]. The SWB programme cost the Brazilian Federal Government around R$ 12 billion (around US$ 3.5 billion). The scholarships were awarded for students and researchers in the fields of science, engineering, technology, and mathematics. The programme offered seven types of scholarships for Brazilian students and researchers: (1) visiting undergraduate, (2) Technological and Innovation Development, (3) Professional Master[9], (4) vis-

[8]The aims of the SWB programme were revised in 22 January 2013. When the SWB programme was implemented in 2011, the programme intended to distribute 101,000 scholarships between 2011 and 2014 through public funding. In the revision, the distribution of the scholarships was extended until 2015. Moreover, it was stipulated that 75,000 of the scholarships would be funded by the Federal Government, and 26,000 scholarships by the private sector.

[9]Scholarships for Professional Masters became available in 2014.

iting PhD, (5) full PhD, (6) Post-Doctorate, and (7) Special Visiting Researcher. The visiting PhD students and visiting undergraduate students conducted their studies in a foreign university or research institution for a semester or a year and then returned to their university in Brazil to complete the degree. Seventy-nine per cent of the scholarships distributed between 2011 and 2015 were awarded to visiting undergraduate students, followed by visiting PhD students (around 10 per cent) and post-doctorate researchers (around five per cent). By January 2016, the SWB had distributed 92,880 scholarships of the expected 101,000 (SWB, 2016). After the impeachment of President Dilma Rousseff on August 2016, the new president, Michel Temer, announced that the SWB programme would continue only with scholarships for graduate students. (Exame, 2016; Folha de Sao Paulo, 2016).

This research focused on analysing the first phase of the SWB programme, which corresponded to the first presidential mandate of Dilma Rousseff (from 2011 to 2014). Moreover, because of the nature of the data available, it only examined undergraduate students participating in the SWB programme. Therefore, in what follows, the application process for the visiting undergraduate is described.

In order to apply for a SWB visiting undergraduate scholarship, students had to satisfy the following eligibility criteria:

1. Have attained 600 points or more in the High School National Exam (ENEM) taken after 2009;

2. Have completed a minimum of 20 per cent of their credits and no more than

90 per cent of their undergraduate program credits;

3. Be enrolled in the subjects covered by the programme;

4. Demonstrate proficiency in the language of the country where the university is located, according to the announcement of the scholarship[10].

Figure 3 illustrates the application process for the SWB undergraduate programme.

Figure 3: Application Process for SWB Undergraduate Programme.

First, the student must send his/her application to the universities' representative organisation in the country where he/she wants to apply (e.g., Universities UK in the United Kingdom, and Fulbright in the United States). In the application, the student must indicate three universities where he/she wants to study. Later, the representative organization identifies which universities are offering places and allocates students according to the following qualifying criteria:

1. Points attained in the National Exam (ENEM);

2. Academic standing within the Brazilian University;

3. Participation in Academic Olympiad[11];

[10]Science without Borders created the English without Borders online course for all undergraduate students in federal universities or undergraduate students in private higher education institutions. The purpose of English without Borders was to teach English for free for students and researchers who wanted to apply for an SWB scholarship. Furthermore, Science without Borders provided language immersion scholarships (up to 6 months) for selected countries. Students who applied for this language immersion scholarship did not have to demonstrate proficiency in the language of the country where they were applying.

[11]National or international competitions in various areas of science among high school stu-

4. Undergraduate Scholarships (E.g.: Scientific Initiation, Teaching Assistant).

The host university then evaluates the application and makes the decision on whether or not to offer the student a place. If accepted, the student receives a scholarship, which covers tuition and a monthly stipend, which vary according to the country where the university is located and to whether the university offers student accommodation (see table 4). An additional monthly stipend is provided for cities with high living costs (e.g., US$ 400 for the United States). Moreover, all undergraduate students receive financial support for installation (US$ 1,320), health insurance (US$ 1,080), and educational material (US$ 1,000). At the end of the SWB undergraduate scholarship, students must return to Brazil within 30 days and must remain in the country for a period not inferior to the duration of the scholarship.

Table 4: Undergraduate Scholarship Monthly Stipend in the SWB Programme (Selected Countries).

Country	USA	EU	UK	Canada	Australia
Without Accommodation	US$ 870	€870	870	C$984	A$ 1,300
With Accommodation	US$ 300	€300	420	C$ 340	A$ 380

Source: http://www.cienciasemfronteiras.gov.br/web/csf/valores-de-auxilios-e-bolsas

Table 5 shows the distribution of numbers of undergraduate scholarships by year of the SWB programme. The programme awarded 60,597 for visiting undergraduate students until the end of 2014 (around 83 per cent of the total number of undergraduate scholarships), which is the period analysed in this research.

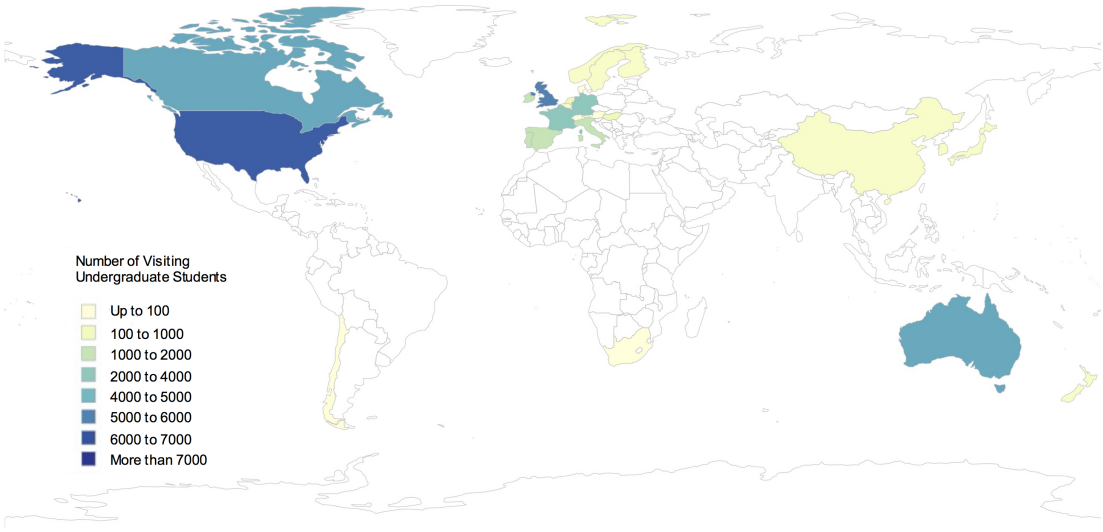
Figure 4 shows the distribution of visiting undergraduate students participating

dents (e.g.: International Mathematical Olympiad)

Table 5: Number and Percentage of Undergraduate Scholarship by Year of the SWB Programme.

Year	Number	Percentage
2011	910	1.24%
2012	10,279	14.01%
2013	19,562	26.67%
2014	29,846	40.69%
2015	12,755	17.39%
Total	73,352	100.00%

in the SWB programme by host country for students who received a scholarship between 2011 and 2014. The majority of the visiting undergraduate students were in North America (United States and Canada) or in Western Europe. Among Latin American countries, only Chile appeared in the list of host countries with visiting undergraduate students. In Asia, Chinese, Japanese and South Korean universities have also received undergraduate students with SWB scholarships. Until 2012, the country with the highest number of scholarship was Portugal. However, the Brazilian government reduced the number of scholarships to this country, since one of the main goals of the SWB programme is for Brazilian students to learn a foreign language.



Source: http://www.cienciasemfronteiras.gov.br/web/csf/bolsistas-pelo-mundo1

Figure 4: Number of Undergraduate Students in the SWB Programme by Host Country.

Chapter 4

4 Data

4.1 ENEM Datasets

In order to investigate the effect of international mobility on education inequalities among Brazilian undergraduate students, the datasets for the High School National Exam (ENEM, acronym in Portuguese) were analysed. As explained in the background chapter, the ENEM was one of the three exams created to evaluate the education system in the country. The ENEM is a yearly non-mandatory exam taken during a weekend at the end of the academic year by students finishing upper secondary education. The exam is coordinated by the INEP and is taken by a large proportion of Brazilian high school students (in 2013, more than nine million students took the test). Since 2004, higher education institutions have been using students' ENEM scores as part of their admission process. Students' score in the ENEM exam is considered part of the eligibility criteria for governmental scholarship or loan programmes and it is also used as a certification for an upper secondary education degree. Table 6 shows the number of students who applied to sit the exam, the dates on which the exams were taken and the dates on which the results were published for the ENEM between 2009 and 2013. The increasing number of students is explained by the gradual adop-

tion of the ENEM exam score in the admission process of several universities and governmental scholarships and loans.

Table 6: Number of Students Who Applied to Take the ENEM, the Dates on Which the Exams Were Taken, and the Dates on Which the Results Were Published.

Year	Number of Students	Exam Dates	Results Dates
2009	4,148,721	5th & 6th December 2009[a]	28th January 2010
2010	4,626,094	6th & 7th November 2010[b]	14th January 2011
2011	6,497,466	22nd & 23rd October 2011	21st December 2011
2012	7,173,574	3rd & 4th November 2012	28th December 2012
2013	9,519,827	26nd & 27th October 2013	3rd January 2014

Source: National Institute for Educational Studies and Research Anísio Teixeira (INEP).
Notes:
a. The ENEM 2009 was originally scheduled to the 3rd and 4th October 2009. The exam was rescheduled to the 5th and 6th December 2009 after a leak of the exam. 40 per cent of the students who applied for ENEM exam did not attend on the new dates.
b. Because of printing problems, 9.500 students retook the Human Science and Natural Science tests (tests performed on the first day of the exam) on 15th December 2010.

The exam comprises 180 multiple-choice questions equally divided into four tests in different areas of knowledge (Languages and Codes, Human Sciences, Natural Sciences and Mathematics). The ENEM exam also includes an essay on a specific theme about Brazilian society. In 2012, for example, students were asked to write an essay about immigration in the XXIst century in Brazil. In the first day of the exam, the students take the Natural Sciences and Human Sciences tests, and in the second day of the exam, students take the Language and Codes, and Mathematics tests and write the Essay. Each test and the essay in the ENEM exam is scored from 0 to 1,000 points. The ENEM exam's total score corresponds to the average score in the four tests and in the essay[12]. Since 2009, the ENEM

[12]Universities which use the ENEM in their admission process might apply different weights when calculating the average exam score according to the undergraduate course the student is

has been designed using Item Response Theory (IRT), which allows test score comparability between years.

Students participating in the exam also complete an extensive socioeconomic questionnaire. The ENEM 2009 socioeconomic questionnaire was optional and comprised 293 questions, which included information on students' cultural and studying habits, and their opinion on the labour market and on discrimination and prejudice. In this year, a high number of students did not answer the socioeconomic questionnaire (around 45 per cent of the students who took the ENEM in 2009). In 2010, the number of questions in the socioeconomic questionnaire reduced drastically, but it was still optional (around one per cent of the students who took the ENEM in 2010 did not reply to the socioeconomic questionnaire). Starting in 2011, the ENEM socioeconomic questionnaire became compulsory. The ENEM datasets are available for download at INEP's website[13].

Figure 5 presents the questions that were asked in the ENEM taken between 2009 and 2013. Besides students' socioeconomic characteristics and test scores, the datasets also comprise information on students' upper secondary education characteristics and motivation for taking the ENEM exam. The variable for foreign language choice in the ENEM exam was not available only in the ENEM 2009 dataset.

applying for.

[13]http://portal.inep.gov.br/basica-levantamentos-acessar

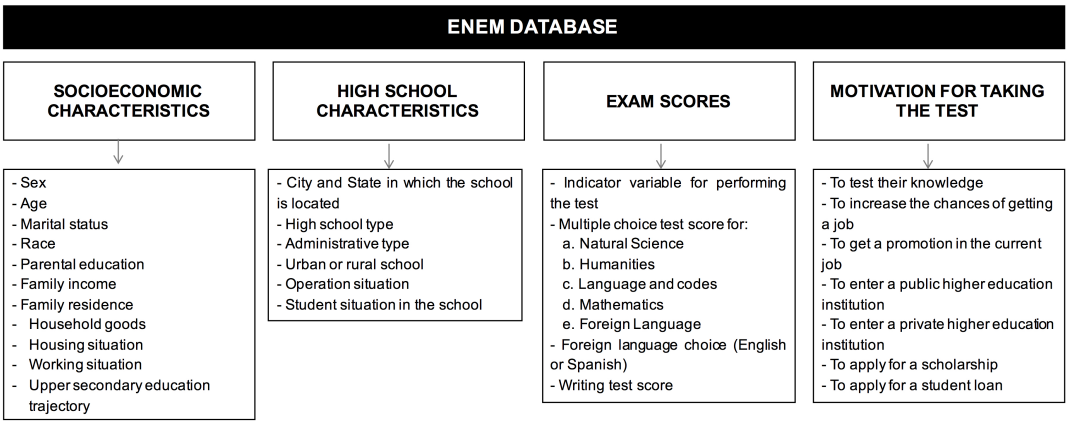


Figure 5: Variables Comprised in the ENEM Datasets.

4.2 Data on the SWB Programme

Students' performance in the ENEM was considered an eligibility criterion for participation in the SWB programme: students must achieve 600 points or more in the ENEM exam taken after 2009 in order to apply for the scholarship. Nevertheless, some of the SWB scholarship calls accepted applications from students who did not fulfil the ENEM criterion. In these calls, candidates who did not achieve 600 points in the ENEM carried out after 2009, or who did not take the ENEM exam, or even candidates who took the ENEM before 2009, could be classified if students who satisfied the criterion did not fill in all the available places. Of the 103 calls for undergraduate SWB scholarships from 2011 to 2014, 17 calls accepted students who did not complete the ENEM score criterion[14].

Constructing a dataset of students in the SWB required merging administrative data from three different institutions. Students in the SWB are funded by one of two funding sources – CAPES (Coordination for Training of Higher Education

[14]The files for four calls were not available on the SWB website.

Personnel) and CNPq (National Council for Scientific and Technological Development). CAPES and CNPq provided the Brazilian national identification numbers of all the funded undergraduate students, and using this number, INEP generated an indicator variable for each student awarded an SWB undergraduate scholarship in the 2009 to 2013 ENEM datasets (Figure 6). These years capture the SWB undergraduate scholarship awarded during between 2011 and 2014. The information on students participating in the SWB programme was extracted by the CNPq and CAPES on 1st December 2014.

The negotiations to access the data of students participating in the SWB programme lasted around a year and a half and was only agreed after confidentiality and anonymity of the students were guaranteed. I have signed an agreement with the Brazilian government stating that I would not try to identify any student in the datasets and that I could not share the datasets with any other researcher. Moreover, in order to prevent unauthorised access, the datasets were stored on an encrypted hard drive.

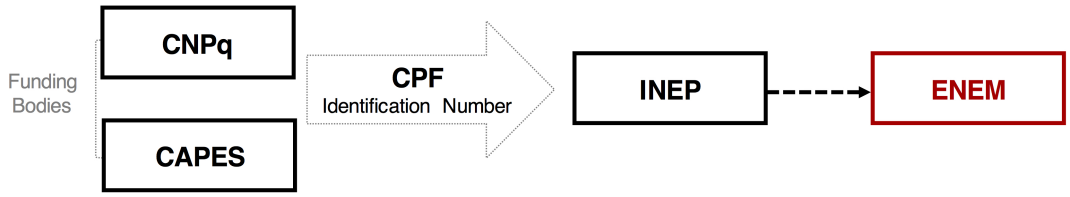


Figure 6: Constructing a Dataset of Students in the SWB Undergraduate Programme.

Of the 61,708[15] national identification numbers provided by the two funding

[15]According to the SWB programme website, 60,597 undergraduate scholarships were implemented before the end of 2014. The difference between the number of students identified by

sources, INEP identified 52,030 undergraduate students in the ENEM datasets who participated in the SWB between 2009 and 2014. 9,678 students were not identified by the INEP, and, therefore, no information was available for these students. For that reason, these students were not considered in the analysis. These are possibly students who applied for specific calls for SWB scholarships, which either accepted applications from students who did not achieve 600 points in the ENEM carried out after 2009, students who did not take the ENEM exam, or students who sat the ENEM before 2009.

Two different datasets were created to understand the relationship between socioeconomic characteristics and international mobility among Brazilian undergraduate students. The first dataset was used to analyse the inequality in access to the SWB programme, and comprised a dataset with students who took all tests in the ENEM exam, scored 600 points or more in the ENEM exam, and were between 16 and 32 years old when they sat the ENEM. The second dataset was used to examine the inequality within the SWB programme and comprised only students participating in the SWB programme who were funded by the CNPq. This dataset was merged with information on the prestige of the university of destination during the SWB programme, and on the characteristics of the Brazilian higher education institution. Below, the two datasets are detailed.

the two funding bodies and the official numbers might be that 1,111 students were awarded an SWB scholarship but still had not started their period studying abroad.

4.3 Dataset for Examining Inequality in Access to the SWB Programme

To measure the likelihood of participating in the SWB programme by students' socioeconomic characteristics (**RQ01**), the ENEM datasets with all students who took the exam between 2009 and 2013 were used. Of the 52,030 SWB undergraduate students who were identified in the ENEM datasets, 27,850 students took the ENEM exam more than one time (around 54 per cent). The year in which the students with an SWB undergraduate scholarship received the highest mark was considered in the analysis. This criterion was also applied in the selection for the SWB programme for students who took the ENEM exam more than one time after 2009. However, it was not possible to identify how many times students who were not awarded an SWB undergraduate scholarship took the ENEM exam. Moreover, as explained before, the ENEM datasets comprise information on students finishing upper secondary education in Brazil. These datasets do not have information on whether students enter a higher education institution or whether they enter a STEM undergraduate programme. Therefore, the control group comprises a much more diverse group compared to the students who received an SWB scholarship. The first comprises students finishing upper secondary education who took the ENEM after 2009 and did not receive an SWB scholarship, while the second comprises students who are in the STEM undergraduate course and received an SWB scholarship.

In order to make the control group more comparable and, therefore, understand the effect of students' socioeconomic background and foreign language knowledge on the likelihood of participating in the SWB undergraduate programme, the following selection criteria were applied.

4.3.1 Participation in the ENEM Exam

First, only students who took all tests in the ENEM exam were selected. As expected, students who did not take any test or only attended one day of the ENEM exam have a much lower overall performance than students who took all tests in the ENEM exam. Moreover, the former students were from a more disadvantageous socioeconomic background when compared to the latter students.

Students who were awarded with an SWB undergraduate scholarship were more likely to have taken all tests when compared to students who were not awarded with an SWB scholarship. Only about five per cent of the students with an SWB undergraduate scholarship skipped any tests or only attended one day of the ENEM exam (N = 2,421 students), as against almost half of the students who were not awarded with an SWB scholarship (N = 14,725,027). Therefore, including students who did not take all tests in the analysis would have underestimated the measures for socioeconomic background and test scores for students who participated in the ENEM exam and were not awarded with an SWB undergraduate scholarship (control group). After selecting only students who took all tests, the data comprised 17,914,046 students in the control group and 49,609

students with an SWB scholarship.

4.3.2 ENEM Exam Scores

The overall score in the ENEM exam was considered an eligibility criterion in the SWB programme for undergraduate students: they must have scored 600 points or more in the ENEM exam taken after 2009. Therefore, only students who satisfied this criterion were selected. Figure 7 shows the distribution for the ENEM exam scores for students in the control group and for students who participated in the SWB programme, before and after selecting for students who scored 600 points or more.

For the 17,914,046 students in the control group, 2,532,439 students scored 600 points or more in the ENEM exam (around 14 per cent of the total). For the 49,609 students who were awarded with an SWB scholarship, 48,421 scored 600 points or more (around 98 per cent of the total). As said before, students who scored less than 600 points in the ENEM exam and received an SWB scholarship might have been accepted in the calls which allocated the remaining places for students who did not fulfil the ENEM criterion.

Figure 8 shows the distribution for Mathematics test scores for students in the control group and for students who were awarded with an SWB undergraduate scholarship, before and after selecting only students who scored 600 points or more in the ENEM exam. Students participating in the SWB programme must be enrolled in a STEM undergraduate course, which can explain the higher score in

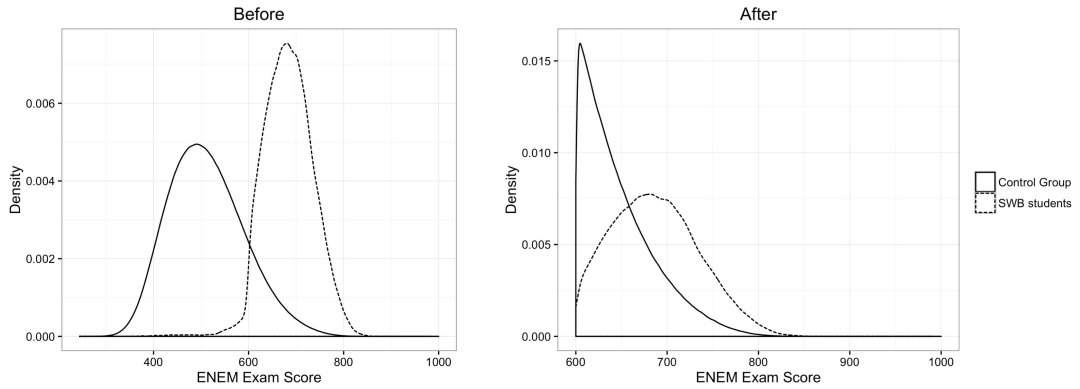


Figure 7: Distribution for ENEM Exam Score Before and After Selecting for Students Who Scored 600 Point or More.

Mathematics for students participating in the SWB programme. Before selecting for students who scored 600 points or more, students in the control group had a much lower Mathematics test score when compared to students in the SWB programme (standardised mean and standard deviation for the control group = -0.006, 0.995; standardised mean and standard deviation for the SWB students = 2.012, 0.855). After selecting only students who scored 600 points or more, the distribution was more similar, but students in the SWB programme still had a higher Mathematics score (standardised mean and standard deviation for the control group = 1.402, 0.787; standardised mean and standard deviation for the SWB students = 2.046, 0.822).

4.3.3 Students' Age

Last, only students who were between 16 and 32 years old were selected. Collares (2013) showed that the expansion of higher education in Brazil benefited older cohorts of students. Between 1982 and 2006, there was a significant increase in

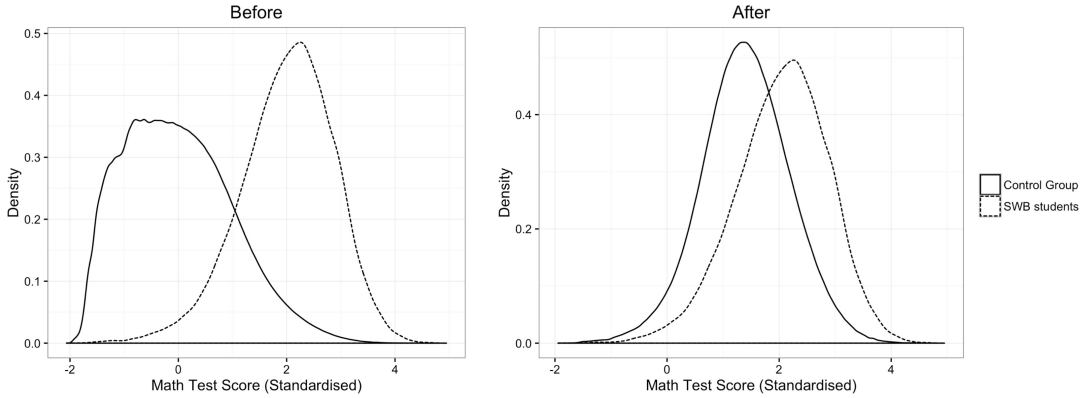


Figure 8: Distribution for Math Test Score in the ENEM Exam Before and After Selecting for Students Who Scored 600 Point or More.

the enrollment in post-secondary education in Brazil not only for the expected age (18-24 years old), but also for students between 25 and 32 years old. For that reason, the older group, students who were between 25 and 32 years old, were also included in the analysis. Figure 9 shows the boxplots for age before and after selecting students who were between 16 and 32 years old.

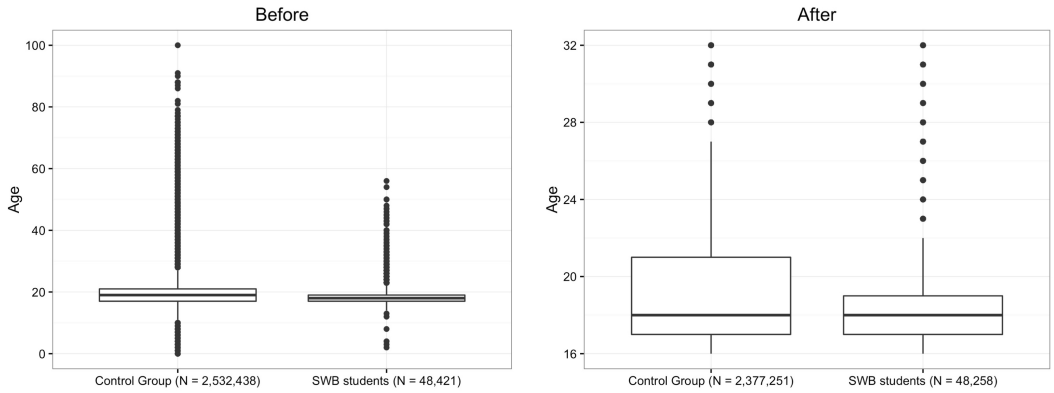


Figure 9: Distribution for Students' Age Before and After Selecting for Students Who Were Between 16 and 32 Years Old When Taking the ENEM.

Table 7 shows the final number of cases for the control group and for students participating in the SWB programme by year of the ENEM. After the selection,

there is a substantial decrease in the number of cases for the control group, while the number of cases for students who received an SWB scholarship does not change drastically. Eighty-seven per cent of the students in the control group were not selected for the analysis, while only three per cent of the students in the SWB programme were not selected.

Table 7: Number of Cases After the Selection by Year of the ENEM.

	2009	2010	2011	2012	2013	Total	Δ (%)
Control Group	384,138	538,735	445,367	488,006	521,004	2,377,251	-87
SWB Students	17,228	17,695	8,758	1,757	2,820	48,258	-3

As can be seen in table 7, there was a significant decrease in the number of students who received an SWB scholarship throughout the years of the ENEM. As said before, the SWB programme was implemented in 2011. Students who scored 600 points or more before the implementation of the SWB programme may already have satisfied all other requirements for applying for the scholarship (e.g.: having completed a minimum of 20 per cent of their undergraduate credits). Therefore, they might have been more likely to apply for an SWB scholarship when compared to students who sat the ENEM after 2011.

4.3.4 Data Validation

To validate the data selected to analyse the SWB programme, the Higher Education National Exam (ENADE) was used. The ENADE has been conducted since 2004 with the purpose of evaluating the Brazilian higher education system. Each year the ENADE has evaluated different undergraduate programmes. To estimate

the learning gains during their undergraduate studies, a sample of freshman and sophomore students enrolled in the undergraduate programme evaluated that year takes the test. The ENADE also requires that the students participating in the exam complete a socioeconomic questionnaire. In 2013 and 2014, the ENADE's socioeconomic questionnaire included a question regarding international mobility during the undergraduate programme for students in their sophomore year. In 2013, students in the health sciences field of studies were evaluated, while, in 2014, students in STEM undergraduate degrees, and some social sciences took the test. Appendix A shows the undergraduate degrees evaluated in the ENADE 2013 and 2014.

Table 8 shows the percentages of sophomore students by type of international mobility programme in the ENADE 2013 and 2014. The dataset for ENADE 2013 comprised 128,985 students who did not participate in an international mobility programme as undergraduates (96.74 per cent) and 720 students who received an SWB scholarship (0.54 per cent). The dataset for the ENADE 2014 comprised 281,352 (94.77 per cent) students who did not participate in an international mobility programme and 5,730 students who received an SWB scholarship (1.93 per cent).

The socioeconomic characteristics of the students who were finishing their undergraduate degree and did not participate in an international mobility programme in the ENADE dataset were compared to the socioeconomic characteristics of the students selected for the control group in the ENEM datasets. The aim was to

Table 8: Type of International Mobility Programme by Year of the ENADE (in Percentages) for Students Who Were Between 16 and 32 Years Old.

Type of International Mobility Programme	2013	2014
Did Not Participate	96.74	94.77
SWB Programme	0.54	1.93
Programme Funded by the Federal Government	0.11	0.46
Programme Funded by the State Government	0.04	0.06
Programme Promoted by the H.E. Institution	0.99	1.00
Other Programmes (Non-institutional)	1.57	1.78
Number of Cases	100	100
	(n = 133,328)	(n = 296,866)
Missing Cases (Number of Cases)	18,317	40,833

examine whether the socioeconomic characteristics of students selected as the control group in the ENEM datasets were similar to those of students finishing higher education in the country. Table 9 presents the frequency distribution for gender, race and parental education for students finishing higher education who did not participate in an international mobility programme in the ENADE datasets and for the students selected for the control group in the ENEM dataset.

Pearson's Chi-squared tests were performed to compare the distribution of students' socioeconomic characteristics by dataset. The distributions of the socioeconomic characteristics for students who were selected for the control group in the ENEM datasets were statistically different from students finishing higher education who did not participate in any mobility programme in the ENADE datasets. Students selected for the control group in the ENEM datasets were from more advantageous socioeconomic backgrounds when compared to students who were finishing higher education in the ENADE datasets. The first group of students tend to be white and have parents with higher levels of schooling when

Table 9: Frequency Distribution (in Percentages) of the Socioeconomic Characteristics for Students Who Did Not Participate in a International Mobility Programme in the ENADE Dataset and for Students in the Control Group in the ENEM Dataset.

	ENEM	ENADE
Gender		
Male	48.54	40.12
Female	51.46	59.88
Number of Cases	100 (n = 2,377,247)	100 (n = 410,337)
Missing (Number of Cases)	4	0
$\chi^2_{(1)}$		9,950
p-value		$p < 0.001$
Race[a]		
White	62.03	56.49
Black	6.90	8.78
Pardo (Mixed-race)	27.98	32.28
Asian	2.82	1.74
Indigenous	0.26	0.72
Number of Cases	100 (n = 2,271,432)	100 (n = 410,184)
Missing (Number of Cases)	105,819	153
$\chi^2_{(4)}$		9,410.3
p-value		$p < 0.001$
ParentalEducation		
Neither Have a H.E. Degree	50.33	65.31
One Has a H.E. Degree	26.08	22.56
Both Have a H.E. Degree	23.60	12.12
Number of Cases	100 (n = 2,331,176)	100 (n = 409,694)
Missing (Number of Cases)	46,075	643
$\chi^2_{(2)}$		37,537
p-value		$p < 0.001$

Note:

a. The variable for race was coded into six categories in the ENEM dataset - undeclared, white, black, *pardo* (mixed-race), Asian, and indigenous -, and into five categories in the ENADE dataset - white, black, *pardo* (mixed-race), Asian, and indigenous. To compare the racial distribution between datasets, the category for students who did not declared their race was excluded from the ENEM dataset.

compared to students in the second group. Therefore, the models examining the inequality in access to the SWB programme might underestimate the effects of students' socioeconomic characteristics in the likelihood of participating in the

SWB programme.

4.3.5 Students in the SWB Programme Who Were Excluded From the Analysis

Around three per cent of the students in the SWB undergraduate programme scored less than 600 points in the ENEM exam and were less than 16 years old or more than 32 years old (N = 1,351 students). These students were not included in the models predicting the likelihood of participating in the SWB undergraduate programme and in the models estimating the prestige of university of destination during the SWB programme. The aim of this section is to examine the socioeconomic characteristics and test scores of the students excluded from the analysis[16].

Table 10 presents the frequency statistics for socioeconomic characteristics by whether or not a student in the SWB undergraduate programme was selected for the analysis. Pearson's Chi-squared tests were performed to compare the distribution for students' socioeconomic characteristics by whether they were selected for the analysis.

The Pearson's Chi-squared test showed that the distribution for gender was not statistically different for students who were selected and students who were not selected for the analysis. Nevertheless, the distribution for race and parental edu-

[16]The 2,421 students who did not take all tests in the ENEM exam were not examined in this section. These students were less likely to complete the socioeconomic questionnaire in the year in which they were compulsory (between 2009 and 2010), and there is not information on all their test scores in the ENEM exam.

Table 10: Frequency Distribution (in Percentages) of the Socioeconomic Characteristics for Students Participating in the SWB Programme by Whether They Were Selected for the Analysis.

	Selected	Not Selected
Gender		
Male	55.90	55.81
Female	44.10	44.19
Number of Cases	100 (n = 48,258)	100 (n = 1,351)
Missing (Number of Cases)	0	0
$\chi^2_{(1)}$		0.00
p-value		p < 0.97
Race		
Undeclared	3.72	2.91
White	65.63	53.18
Black	4.54	9.43
Pardo (Mixed-race)	22.80	32.26
Asian	3.12	2.15
Indigenous	0.20	0.08
Number of Cases	100 (n = 46,991)	100 (n = 1,305)
Missing (Number of Cases)	1,267	46
$\chi^2_{(3)}$ [a]		132.17
p-value		p < 0.001
Parental Education		
Neither Have a H.E. Degree	34.79	61.15
One Has a H.E. Degree	29.54	24.15
Both Have a H.E. Degree	35.67	14.71
Number of Cases	100 (n = 46,708)	100 (n = 1,292)
Missing (Number of Cases)	1,550	59
$\chi^2_{(2)}$		415.80
p-value		p < 0.001

Note:

a. In order to calculate the Chi-squared test for the variable for race, the categories for Asian and Indigenous were recoded into one. Both categories had a small number of cases, and were leading to incorrect Chi-squared approximation. Therefore, the Chi-squared test was calculated considering three degrees of freedom.

cation was statistically different between students who were included and students who were excluded from the analysis. SWB students who were included in the analysis were more likely to be white (65.63 per cent) when compared to stu-

dents who were excluded from the analysis (53.18 per cent). Also, SWB students included in the analysis were more likely to have both parents with a higher education degree (35.67 per cent) when compared to students excluded from the analysis (14.71 per cent). The students participating in the SWB programme who scored less than 600 points in the ENEM exam and were less than 16 years old or more than 32 years old were from a lower socioeconomic background. Therefore, although this group comprised only three per cent, the dataset for inequality in access to the SWB programme might overestimate the socioeconomic background of students participating in the programme.

4.4 Dataset for Examining the Inequality Within the SWB Programme

To examine the effect of students' socioeconomic characteristics on the prestige of the university of destination during the SWB programme (**RQ02**), the dataset provided by the National Council of Technological and Scientific Development (CNPq, acronym in Portuguese) was used. The CNPq is one of the two funding bodies of the SWB programme. The CNPq was created in 1951 with the purpose of promoting scientific and technological research, and encouraging the development of human resources for research in Brazil. The CNPq is an organisation under the Ministry of Science and Technology. It is the main provider of undergraduate and graduate scholarships in Brazil, and fully or partially funds research projects and research programmes. The CNPq provided, in addition to

students' national identification number, the name of the Brazilian higher education institution in which the student was enrolled, the area of knowledge, and the university of destination during the SWB programme for all students participating in the programme who were funded by the organisation.

Figure 10 illustrates how the dataset to examine the inequality within the SWB programme was created. The INEP merged the information provided by the CNPq with the ENEM datasets. Of the 23,260 national identification numbers provided by CNPq, 17,329 students were identified in the ENEM datasets by the INEP. Of the 17,329 students identified by the INEP, 15,567 students took all tests in the ENEM exam, scored 600 points or more in the ENEM exam, and were between 16 and 32 years old (15,329 students were funded only by CNPq, and 238 students were funded by the CNPq and CAPES). Following this, the world ranking positions of the university of destination during the SWB programme on world university rankings, used to measure the prestige of the university, were merged with the information provided by the CNPq. Finally, the information on the Brazilian higher education institutions' characteristics, comprised in the Higher Education Census, was also merged into the data.

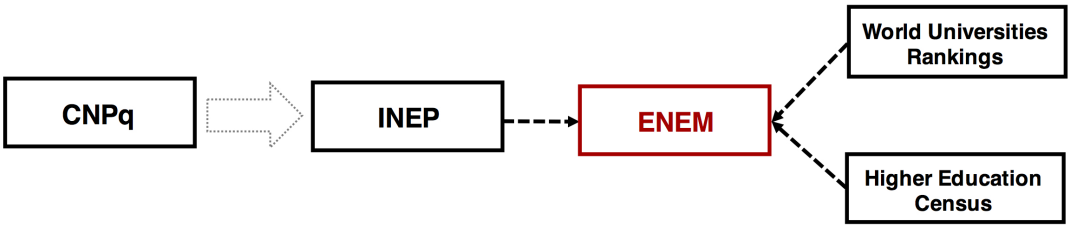


Figure 10: Constructing a Dataset of Students Funded by CNPq During the SWB Programme.

Appendix B examines the differences between students funded by the CNPq and students funded by the CAPES during the SWB programme regarding their test scores and socioeconomic characteristics. Students who were funded by the CNPq have higher test scores, parents with higher levels of education and higher family income when compared to students who were funded by the CAPES. Therefore, the results in the chapter regarding inequality within the SWB programme are specific to students who are funded by the CNPq and cannot be generalised for all students participating in the SWB programme.

4.4.1 Prestige of the Universities of Destination During the SWB Programme

The prestige of the university of destination during the SWB programme was measured using the three most renowned international university rankings (Yudkevich et al., 2015; Huang, 2011): the Academic Ranking of World Universities (ARWU)[17], the QS World Universities Ranking (QS) and the Times Higher Education World Universities Ranking (THE).

Amsler and Bolsmann (2012) argued that "rankings may be understood not as neutral methods for understanding the quality or value of education, but as political-ideological technologies of valuation and hierarchisation (...)" (p.284). They, therefore, create a vicious circle: on the one hand, universities that frequently appear in world university rankings attract high-achieving students, bet-

[17]Also known as The Shanghai Jiao Tong University Rankings.

ter researchers and more funding. On the other hand, universities that do not appear in world university rankings have their importance reduced. Despite the criticism levelled against world university rankings, several studies show that they affect students' decisions when applying to a higher education institution (e.g., Sauder and Lancaster, 2006; Hazelkorn, 2007; Thakur, 2007). Roberts and Thompson (2007), for example, analysed the relationship between league table ranking and admission in several universities. They showed that high-achievement students are more likely to use world university ranking tables to guide their choices. Therefore, they are interpreted as indicators of prestige by students.

Of the 15,567 students funded by the CNPq, 11,216 students were in a higher education institution ranked by at least one of the three most prestigious international university rankings during the SWB programme and had no missing information regarding their socioeconomic characteristics. 8,397 students were in a university ranked by ARWU between 2011 and 2014. 10,815 students were in a university ranked by QS and 9,280 were in a university ranked by THE. Appendix C describes the background, methodology and criticism of the three rankings used to measure the prestige of the universities of destination during the SWB programme.

4.4.2 Standardised Ranking Scores

To measure the average prestige of the university of destination, each ranking was treated separately. The ranking position between 2011 and 2014 of the university of destination was considered since they represent the years of the SWB programme analysed in this thesis. First, the standardised score for the ranking position was calculated for each year considered in the analysis. Second, the mean standardised ranking position from 2011 to 2014 for each university was calculated. Last, the mean standardised position was multiplied by -1 in order to facilitate the interpretation. Therefore, the higher the mean standardised ranking, the more prestigious the university is.

In Table 11, three universities were selected to demonstrate the calculation of the mean standardised rank position for the three rankings considered: Oxford, York, and Heriot-Watt. Oxford and York appeared in the three international rankings. Heriot-Watt did not appear in the ARWU ranking. Therefore, students who went to Heriot-Watt during the SWB programme are excluded from the models considering the ARWU ranking.

4.4.3 Higher Education Census

The annual Higher Education Census comprises information on Brazilian higher education institutions: type and number of undergraduate programs (face to

Table 11: Examples on How the Mean Standardised Ranking Scores Were Calculated by International World Ranking.

University	Ranking	Ranking Position				Standardised Ranking Position				Mean Standardised Ranking $(* - 1)$
		2014	2013	2012	2011	2014	2013	2012	2011	
University of Oxford	ARWU	9	10	10	10	-1.44	-1.43	-1.42	-1.42	1.43
	QS	5	6	5	5	-1.37	-1.38	-1.45	-1.48	1.42
	THE	2	2	4	6	-1.61	-1.61	-1.62	-1.61	1.61
University of York	ARWU	201	201	201	201	0.14	0.12	0.12	0.13	-0.13
	QS	120	124	110	96	-0.80	-0.77	-0.82	-0.89	0.82
	THE	100	103	121	81	-0.68	-0.65	-0.49	-0.34	0.54
Heriot-Watt University	ARWU	NA	NA	NA	NA	NA	NA	NA	NA	NA
	QS	352	369	388	401	0.36	0.48	0.85	1.08	-0.69
	THE	301	351	350	-	1.25	1.71	1.71	-	-1.56

face and distance), number of places offered, number of enrolments, number of students entering and concluding, and information regarding administrative and teaching staff. Furthermore, it collects information on the higher education institutions' configuration: administrative type, organization type, city of the dean's office, number of libraries, and wireless access.

The higher education institutions complete the Higher Education Census questionnaire online. Subsequently, the INEP analyses the reliability of the data. The Higher Education Census datasets from 1995 to 2013 are available for download on the INEP website[18]. The information on administrative type, number of staff, and region of Brazil where the university is located was used to analyse the effect of the Brazilian higher education institution on university and country of destination during the SWB programme.

Only Brazilian higher education institutions that had 20 or more students participating in the SWB programme were selected for the analysis on inequality within the SWB programme. 10,161 students were in at least one of the world university

[18]http://portal.inep.gov.br/web/guest/microdados

rankings considered in the analysis and were in a Brazilian higher education institution with 20 or more students with an SWB scholarship. 7,429 students were in a university ranked by ARWU between 2011 and 2014 and were in a Brazilian higher education institution with 20 or more students in the SWB programme. 9,671 students were in a university ranked by QS, and 8,236 students were in a university ranked by the THE.

4.4.4 Students Excluded From the Analysis

Of the 15,567 students funded by the CNPq, 5,406 students were omitted from the analysis on inequality within the SWB programme. These students were at universities that did not appear in one of the three world university rankings during the SWB programme, or were enrolled in a research institute (which are not evaluated by the world university rankings), or were not in a Brazilian higher education institution with 20 or more students participating in the SWB programme.

Table 12 shows the mean and standard errors for the test scores in the ENEM exam by whether or not students were selected for the analysis of inequality within the SWB programme. The t-tests show that there is a statistically significant difference in the mean test scores between students who were selected and students who were not selected for the analysis for Mathematics, Natural Sciences, Human Sciences and Language and Codes Test Scores[19]. Students who were selected for

[19]Mathematics Test Scores: $t = 21.31$, $p < 0.001$; Natural Sciences Test Score: $t = 16.16$, $p < 0.001$; Human Sciences Test Scores: $t = 13.29$, $p < 0.001$; Language and Codes Test Scores:

the analysis tended to score higher in those tests when compared to students who were not selected for the analysis.

Table 12: Means and Standard Errors (S.E.) for Test Scores in the ENEM Exam by Whether Students Were Selected for the Analysis.

Test in the ENEM Exam	Selected		Not Selected	
	Mean	S.E.	Mean	S.E
Mathematics	758.89	0.81	728.31	1.18
Natural Science	680.96	0.63	663.19	0.90
Human Science	690.85	0.59	677.46	0.82
Language and Codes	655.79	0.50	647.13	0.73
Writing	749.41	1.19	746.81	1.59

Table 13 shows the frequency distribution for students' socioeconomic characteristics by whether students were selected for the analysis of inequality within the SWB programme. Chi-square tests demonstrate that the difference in the distribution for students' socioeconomic characteristics between students who were selected for the analysis and students who were not selected for the analysis is statistically significant. Students who were selected for the analysis were more likely to be male and self-declared as being white, and to have both parents with a higher education degree when compared to students who were not selected for the analysis. Therefore, students who were not in a university ranked in at least one of the three world university rankings during the SWB programme and/or were not in a Brazilian higher education institution with 20 or more students participating in the SWB programme tend to have a lower test score in the ENEM exam and tend to be from a lower socioeconomic background when compared to students.

$t = 9.82$, $p < 0.001$; Writing Test Scores: $t = 1.31$, $p = 0.19$

Table 13: Frequency Distribution (in Percentage) for Students' Socioeconomic Characteristics by Whether Students Were Selected for the Analysis.

	Selected	Not Selected
Sex		
Male	55.97	50.50
Female	44.03	49.50
Number of Cases	100 (n = 10,161)	100 (n = 5,406)
Missing (Number of Cases)	0	0
$\chi^2_{(1)}$	42.29	
p-value	< 0.001	
Race		
Undeclared	3.88	4.64
White	70.67	67.55
Black	2.97	3.59
Pardo (Mixed-race)	18.62	21.11
Asian	3.73	2.95
Indigenous	0.13	0.16
Number of Cases	100 (n = 10,161)	100 (n = 4,983)
Missing (Number of Cases)	0	423
$\chi^2_{(5)}$	30.17	
p-value	< 0.001	
Parental Education		
Neither Have a H.E. Degree	23.50	28.55
One Has a H.E. Degree	28.61	29.10
Both Have a H.E. Degree	47.89	42.35
Number of Cases	100 (n = 10,161)	100 (n = 4,890)
Missing (Number of Cases)	0	516
$\chi^2_{(2)}$	55.68	
p-value	< 0.001	

4.4.5 Data Limitations

The dataset used to analyse the inequality in access to the SWB programme comprised students finishing upper secondary education in the country. The selection criteria applied in the dataset aimed to make the control group more comparable to the students finishing higher education. The data validation showed nevertheless that students selected for the control group of the ENEM dataset were from

a higher socioeconomic background when compared to students finishing higher education in the country. Therefore, the results for the inequality in access to the SWB programme might underestimate the effect of students' socioeconomic characteristics on the likelihood of participating in the SWB. In other words, if there is inequality in access to the programme, it might be higher than the inequality estimated by the models, since students in higher education in the country might be from a lower socioeconomic background when compared to the control group selected for the analysis.

The dataset used to analyse the inequality with the SWB comprised only students funded by one of the two funding bodies of the programme. Students who were funded by the CNPq tend to have a higher score in the ENEM tests and be from a more advantageous socioeconomic background when compared to students funded by the CAPES. Moreover, only students who study in a university ranked in one of the three most prestigious world university rankings during the SWB and were enrolled in a Brazilian higher education institution with 20 or more students participating in the SWB were selected for the analysis within the programme. Therefore, the results of the models examining inequality within the programme might overestimate the effect of students' socioeconomic characteristics on the prestige of the university of destination during the SWB programme, since the dataset used to answer the second research question of this thesis comprised students from a more advantageous socioeconomic background even when compared to the other students participating in the SWB programme.

In addition, the datasets do not have information about students' motivations to study in participating in the SWB programme. Because of time constraints, I could not conduct any qualitative methods, such as interviews and/or focus groups, that were necessary to collect this information. The literature on international mobility shows that students' motivation is an important factor in understanding inequalities in international mobility. For example, Brookes and Waters (2011), shows that student motivation is different depending on students' countries of origin: some research suggested that European students from lower socioeconomic background might pursue international mobility to gain advantaged in their country of origin ("an alternative route to capital accumulation" (p.92)), while East Asian students want to maintain advantage - through the accumulation of cultural capital - and acquire proficiency in English. Therefore, the lack of information on students' motivation to participate in the SWB programme represents a significant gap in understanding the relationship between international mobility and educational inequalities.

Chapter 5

5 Methods

5.1 Probit Regression Models

The literature on persistent inequality, discussed in the literature review, frequently uses generalised linear models to explain the role of students' socioeconomic background on the probability that they will transition to certain levels and/or types of education. The research on persistent inequality combines the literature on educational transition and the tracking literature (Lucas, 2001). Using the model proposed by Mare (1980), the research on education transitions measures educational attainment as a sequence of cumulative transitions in the educational system, using generalised linear models with two possible outcomes (e.g.: logist and probit regressions models) (Breen and Jonsson, 2000). They examine students' likelihood of transitioning to certain levels of education (with 'yes' or 'no' marked as the possible outcomes) according to their socioeconomic backgrounds. The research on educational tracking considers how differences in education trajectories within varying levels of schooling–such as different types of curriculum–affect students, and demonstrates their impact on educational transitions. For example, students who pursue an academic curriculum during secondary education are more likely to transition to higher education. This research

shows that the differences in level of schooling might be explained by differences in students' socioeconomic backgrounds. By only estimating the probability of transitioning, the literature on education transitions ignores the differences within each level, and their consequences for educational attainment. In order to account for these differences, the persistent inequality research proposes using generalised linear models with more than two possible outcomes (e.g.: multinomial logistic, ordinal logistic and ordered probit regressions) to consider different destinations in the educational system (Breen and Jonsson, 2000; Lucas, 2001).

The first research questions aim to understand the effect of students' socioeconomic characteristics on the likelihood of participating in the SWB programme. As discussed in the data chapter, the dataset used to understand the effect of students' socioeconomic backgrounds on the probability of participating in the SWB programme does not comprise information on students' transitions in the educational system. For this reason, this research could not account for the effect of students' socioeconomic backgrounds on the transition between secondary to higher education or differences in the education trajectories within these levels of education. This research, however, considers international mobility to be a transition within the higher education level. The response variable of the analysis therefore could only have two values: student participated and student did not participate in the SWB programme during his or her undergraduate studies. Probit regression models were then performed to predict the probability of participating in the SWB programme considering students' socioeconomic char-

acteristics.

The probit regression model is a type of generalised linear model used to predict the probability of an event occurring given a set of explanatory variables (James et al., 2013). Generalised linear models are used when the assumption of normality—the assumption underlying linear regression models–cannot be satisfied (Tarling, 2009). When predicting the probability of an event occurring, the underlying probability ranges from 0 (the event did not occur) to 1 (the event occurred). Using the least squares estimation, as in linear regression, to estimate the probability of an event occurring would produce infinite positive and negative probabilities, giving an inaccurate estimation of the coefficients. Generalised linear models use link functions to transform non-linear relationships into linear relationships (Pampel, 2000, p. 18) and utilise the maximum likelihood to estimate the coefficients for the explanatory variables (James et al., 2013).

The two most common link functions used in the social sciences to predict the probability of an event occurring are the probit and logit functions. Both have the purpose of taking out the boundaries of 0 and 1 from the binary and proportion data. The former relates the probability of an event occurring to the cumulative distribution function of the Gaussian distribution, while the latter transforms the probability into log-odds. Despite using different transformations, both models produce similar results. Following the research performed by Lucas (2001), which used ordered probit regression, this research also uses the probit link function. The probit regression models performed in this research can be represented by

the generic expression:

$$Pr(Y = 1|X) = \Phi(X'\beta)$$

Where $Pr(Y = 1|X)$ represents the probability of an individual participating in the SWB undergraduate programme X, Φ is the cumulative distribution function (CDF) of the Gaussian distribution, X' represents the matrix of explanatory variables, and β represents the parameters of the explanatory variables. Four probit regression models were performed to examine the association between students' socioeconomic background and their likelihood of participating in the SWB programme (**RQ01**).

The first probit regression model comprises the variables for students' socioeconomic characteristics as explanatory variables. The second model includes variables for students' socioeconomic characteristics and Mathematics test scores. The third model includes students' socioeconomic characteristics, and an indicator variable for students who chose to take the English test for the foreign language section of the ENEM exam. The last model includes the students' socioeconomic characteristics, the indicator variable for students who chose English, and students' Mathematics scores in the ENEM exam. The reasoning for performing the probit models with the indicator variable for foreign language choice separately is discussed in the next section. The probit regression models were performed using R Base Package (R Core Team, 2016).

5.1.1 Explanatory Variables for the Probit Models

Measurements of students' socioeconomic backgrounds, foreign language knowledge, and achievement were used as explanatory variables in the models to analyse inequality in access to the SWB programme. Following the example of the literature on international mobility and persistent inequality, students' socioeconomic background was measured using parental education and family income. Much of the surveyed research on international mobility and education inequality also used parental occupation as a measure of socioeconomic background, but unfortunately, this information was not available in the ENEM datasets.

The variables for father's and mother's education levels were recoded into one variable with three categories: neither have a higher education degree, one has a higher education degree, and both have a higher education degree. The same recoding of parental education has been used successfully in previous research on international mobility (e.g.: Netz and Finger, 2016).

The variables for family income were each transformed from a categorical to a numeric variable. The variable for family income included monthly salaries as ordinal categorical groups. The number and size for the categories for this variable, however, were not equivalent from year to year of ENEM datasets. A standardized variable for family income for each year was therefore created, following the guidelines for standardizing a categorical variable suggested by Powers and Xie (2008). First, the accumulated proportions across categories were calculated.

Then the midpoint of the proportions across the categories were identified. In other words, it was established in which category the proportion reached 50 per cent. Finally, using the midpoint, the proportion was transformed to a z-score based on the standardised normal distribution.

The existing research on international mobility also suggested that foreign language knowledge was an important factor when examining international mobility. Starting in 2010, the ENEM datasets provided information on students' choice of foreign language in the Language and Codes test. Students have to choose between taking an English or a Spanish test. Because this variable was not available for the 401,367 students who performed the ENEM in 2009 (384,139 in the control group and 17,228 with an SWB scholarship), probit models were fitted separately, aiming to analyse the relationship between the likelihood of participating in the SWB programme and the foreign language chosen on the ENEM exam.

The models also included variables for the year in which the ENEM was taken, gender, race, and the standardised Mathematics test score in the ENEM exam[20]. The Mathematics test scores on the ENEM exam were included to take into consideration the areas of knowledge evaluated when applying for the SWB programme. Students applying for an SWB scholarship must be enrolled in STEM undergraduate courses. Therefore, it is expected that these students perform better on the Mathematics portion of the ENEM exam when compared to stu-

[20]Even though the ENEM exam used the IRT, the standardised Mathematics test score was calculated separately for each of the ENEM.

dents in other fields of study. An ordinary least squares (OLS) regression model was fitted to examine the association between students' socioeconomic characteristics and Mathematics test scores. Around 19 per cent of the variance in the Mathematics test scores is explained by students' socioeconomic characteristics (see Appendix D for the OLS regression estimates). Because of this association, the Mathematics score was added in a separated model. The models examined the effects of students' socioeconomic characteristics after controlling for foreign language studied and Mathematics test scores.

Table 14 presents the frequency distribution and chi-square tests for the explanatory variables included in these models, which analyse inequality within the SWB programme by examining whether students of various demographics received an SWB scholarship. Around 72 per cent of the students in the SWB programme took the ENEM in 2009 or 2010. As stated before, the SWB programme was implemented in 2011; therefore, students who completed the exam in 2009 and 2010 were more likely to have completed 20 per cent of their undergraduate course credit (one of the eligibility criteria for the SWB programme) than students who performed the ENEM starting in 2011. The slight increase in the number of students in the control group might be explained by the increase in the number of students applying for the ENEM over the years (see Table 6).

Students in the SWB programme were more likely to be male (55.90 per cent) when compared to students in the control group (48.54 per cent). A higher proportion of students participating in the programme self-declared as white (65.63

per cent) when compared to students who took the ENEM and did not participate in the programme (60.21 per cent). A higher proportion of students in the SWB programme have parents who have a higher education degree (35.67 per cent) when compared to students in the control group (23.60 per cent). Last, the majority of the students with an SWB undergraduate scholarship and in the control group chose English as a foreign language in the Language and Codes test (78.81 and 63.48 per cent, respectively).

Table 15 shows the mean and standard deviation - by whether students participated in the SWB programme - for family income and Mathematics test score. Students in the SWB programme have a higher family income when compared to students in the control group ($t = -60.722, p < 0.001$). They also have a higher Mathematics test score when compared to students in the control group ($t = -166.730, p < 0.001$).

5.2 Multilevel Modelling

As discussed above, the existing research on educational inequality often uses generalised models with two or more outcomes to examine the influence of students' socioeconomic background on educational transitions. However, much of this research does not take into account that individuals are grouped in clusters, such as classrooms, schools or higher education institutions (Raudenbush, 2002), and that such clusters might have an important effect on the likelihood of transitioning to a certain level of education. For example, schools' pedagogical

Table 14: Frequency Distribution (in Percentages) and Chi-square Tests for the Explanatory Variables Used in the Probit Models by Whether Students Participated in the SWB Programme.

Variables	Control Group	SWB Students
Year of the ENEM		
2009	16.16	35.70
2010	22.66	36.67
2011	18.73	18.15
2012	20.53	3.64
2013	21.92	5.84
Number of Cases	100 (n = 2,377,251)	100 (n = 48,258)
Missing Cases (Number of Cases)	0	0
$\chi^2_{(4)}$	27,305.00	
p-value	<0.001	
Gender		
Male	48.54	55.90
Female	51.46	44.10
Number of Cases	100 (n = 2,377,247)	100 (n = 48,258)
Missing Cases (Number of Cases)	4	0
$\chi^2_{(1)}$	1,025.20	
p-value	<0.001	
Race		
Undeclared	2.94	3.72
White	60.21	65.63
Black	6.70	4.54
Pardo (Mixed-race)	27.16	22.80
Asian	2.74	3.12
Indigenous	0.25	0.20
Number of Cases	100 (n = 2,340,338)	100 (n = 46,991)
Missing Cases (Number of Cases)	36,913	1,267
$\chi^2_{(5)}$	994.87	
p-value	<0.001	
Parental Education		
Neither Have a H.E. Degree	50.33	34.79
One Has a H.E. Degree	26.08	29.54
Both Have a H.E. Degree	23.60	35.67
Number of Cases	100 (n = 2,331,176)	100 (n = 46,708)
Missing Cases (Number of Cases)	46,075	1,550
$\chi^2_{(2)}$	5,219.20	
p-value	<0.001	
Foreign Language Choice in the ENEM Exam		
Spanish	36.52	21.19
English	63.48	78.81
Number of Cases	100 (n = 1,993,112)	100 (n = 31,030)
Missing Cases (Number of Cases)	384,139	17,228
$\chi^2_{(1)}$	3,103.00	
p-value	<0.001	

Table 15: Mean and Standard Deviation by Whether Students Participated in the SWB Programme for Family Income and Mathematics Test Score.

Variables	Control Group	SWB Students
Family Income (Standardised)		
Mean	1.16	1.53
Standard Deviation	1.27	1.30
Number of Cases	2,329,084	46,583
t-test	-60.722	
p-value	< 0.001	
Mathematics Test Score (Standardised)		
Mean	1.42	2.05
Standard Deviation	0.79	0.82
Number of Cases	2,377,251	48,258
t-test	-166.730	
p-value	< 0.001	

practices might have an impact on students' educational attainment

Some research, therefore, uses another type of generalised models - known as multilevel models or hierarchical models - to account for the effect of cluster or grouping. The multilevel models take into account the existence of a structure in the data, producing residuals in the individual and in the group levels (Centre for Multilevel Modelling, 2017). Unlike multiple regression, they do not assume that the observations are independent from each other (Goldstein, 2011). Moreover, they estimate the group effect and the effect of the predictors within the group (Centre for Multilevel Modelling, 2017). For example, the multilevel models consider that students are enrolled in schools with different structures or pedagogical practices, which might have an important effect on students' attainment. Soares and Andrade (2006) showed that the policies and pedagogical practices of schools in one of the largest cities in Brazil had an important effect

on all students' educational attainment, including students from disadvantaged socioeconomic backgrounds.

Students participating in the SWB programme were grouped within Brazilian higher education institutions. As discussed in the Background chapter, these institutions play an important role in the selection process for students who will participate in the SWB programme. This situation is known as two-level structure data, the first level being the student participating in the SWB programme, and the second level being the Brazilian higher education institutions. However, the information on the institutions was only available for students who were funded by the CNPq. Therefore, the effect of which Brazilian higher education institution each student was associated with on their selection for the SWB programme could only be estimated for the research questions regarding the inequality within the programme.

Random intercept models[21], a type of multilevel model which allowed different intercepts for each Brazilian higher education institution, were performed to examine the effect of students' socioeconomic characteristics as well as the effect of their associated institutions on the prestige of university of destination during the SWB programme (**RQ02**). These models estimate how much of the variation in the international university ranking is explained by differences between Brazilian higher education institutions (random effect) after considering students' socioe-

[21]Random Slopes models, which allows different slope for each higher education institutions were also performed to analyse inequality within the SWB programme. However, the variation in the slopes was not significant at the 5 per cent level. Therefore, they are not present in this thesis.

conomic characteristics and the institutions' characteristics (fixed effect). Models were performed separately for the ARWU, QS, and THE rankings.

The multilevel models were performed using MLwiN (Rasbash et al., 2009) and the "R2MLwiN" (Zhang at al., 2015) package for R (R Core Team, 2016).

5.2.1 Random Intercept Models

The following random intercept model was used:

$$y_{ij} = \beta_{0ij} + \beta_1 x_{1ij} + \beta_2 z_{1j} + e_{ij} + u_{0j}$$

$$e_{ij} \sim N(0, {\sigma_e}^2)$$

$$u_{0j} \sim N(0, {\sigma_{u0}}^2)$$

Where y_{ij} represents the mean ranking score for the years from 2011 to 2014 for ith student at jth Brazilian higher education institution. x_1 represents variables for students' socioeconomic characteristics (e.g.: gender) for ith student at jth Brazilian higher education institution. β_1 is the parameter for the variable for students' socioeconomic characteristics. z_{1j} represents variables for Brazilian higher education institution characteristics for the jth Brazilian higher education institution. β_2 is the parameter for the variable for students' Brazilian higher education institution characteristics. e_{ij} is the error for ith student at Brazilian higher education institution jth. Finally, u_{0j} is the deviation of the mean ranking

score of jth Brazilian higher education institution from average.

Three random intercept models were performed separately for each world university ranking to examine the association between students' socioeconomic background and the prestige of the university of destination during the SWB programme (**RQ02**). The first comprises the variables for students' socioeconomic characteristics and areas of study in the SWB programme (detailed in the section below). The second model includes the variables for the characteristics of the Brazilian higher education institutions. The third model includes the variable for foreign language choice. As explained before, this variable had a high number of missing cases, and, therefore, it has been added in a separated model.

5.2.2 Explanatory Variables for the Multilevel Models

The measurements of students' socioeconomic backgrounds, foreign language knowledge, and achievement used in the probit regression models, and discussed in detail above, were also used as explanatory variables in the models analysing inequality within the SWB programme. The multilevel models were controlled by students' gender, race, and field within the programme. The last variable was only available for students who were funded by the CNPq while in the SWB programme. Table 16 shows the frequency distribution for the variables used as explanatory variables for this analysis. The distributions for students' socioeconomic characteristics are very similar for the three rankings: the majority of students have two parents with a higher education degree, are male, self-declared

as white, and chose to perform the English test in the ENEM exam. The distributions for field of study are also similar across the world universities rankings. The majority of the students are in Engineering, followed by the Exact and Earth Sciences and Health Sciences.

Table 17 shows the mean and standard deviation for family income and the Mathematics test score for each world university ranking considered in the analysis.

Table 16: Frequency Distribution (in Percentages) for Students' Socioeconomic Characteristics and Foreign Language Choice in the ENEM Exam by World University Ranking.

Variables	ARWU	QS	THE
Gender			
Male	57.44	56.25	57.83
Female	42.56	43.75	42.17
Number of Cases	100 (n = 7,429)	100 (n = 9,671)	100 (n = 8,236)
Race			
Undeclared	3.73	3.95	3.80
White	70.78	70.72	71.11
Black	2.93	3.00	2.85
Pardo (Mixed-race)	18.63	18.43	18.22
Asian	3.78	3.77	3.89
Indigenous	0.15	0.13	0.12
Number of Cases	100 (n = 7,429)	100 (n = 9,671)	100 (n = 8,236)
Parental Education			
Neither Have a H.E. Degree	23.58	23.06	22.49
One Has a H.E. Degree	28.71	28.50	28.44
Both Have a H.E. Degree	47.70	48.44	49.08
Number of Cases	100 (n = 7,429)	100 (n = 9,671)	100 (n = 8,236)
Foreign Language Choice in the ENEM Exam			
English	87.77	87.83	90.11
Spanish	12.23	12.17	9.89
Number of Cases	100 (n = 4,523)	100 (n = 6,055)	100 (n = 5,165)
Missing Cases (Number of Cases)	2,906	3,616	3,071
Area of Knowledge in the SWB			
Agricultural Sciences	4.08	3.74	3.41
Applied Social Sciences	6.52	9.07	6.19
Biological Sciences	9.49	8.55	9.11
Exact and Earth Sciences	15.76	14.41	14.81
Engineering	49.04	49.99	52.53
Health Sciences	10.76	10.23	9.68
Human Sciences	0.15	0.12	0.13
Linguistic, Literature and Arts	0.59	0.59	0.48
Technologies	0.19	0.13	0.16
Other Areas	3.43	3.15	3.52
Number of Cases	100 (n = 7,429)	100 (n = 9,671)	100 (n = 8,236)

Note: Students with missing cases regarding their socioeconomic characteristics were excluded to facilitate merging the ENEM datasets and the information on world universities rankings

Table 17: Mean and Standard Deviation by World University Rankings for Family Income and Mathematics Test Score.

Variables	ARWU	QS	THE
Family Income (Standardised)			
Mean	1.94	1.96	1.98
Standard Deviation	1.27	1.27	1.26
Number of Cases	7,429	9,671	8,236
Mathematics Test Score (Standardised)			
Mean	2.38	2.35	2.39
Standard Deviation	0.76	0.75	0.75
Number of Cases	7,429	9,671	8,236

Chapter 6

6 Findings I

This chapter analyses the inequality in access to the SWB programme. The aim of this chapter is to examine the influence of students' socioeconomic backgrounds on the likelihood of participating in the SWB programme. The first research question, presented in the introduction to this thesis, is therefore investigated.

RQ01. Is there a relationship between students' socioeconomic backgrounds and their likelihood of participating in the SWB undergraduate programme?

For analytic purposes, this chapter is divided into two sections. The first section analyses exclusively the effect of students' socioeconomic characteristics on the likelihood of receiving an SWB scholarship. The second section examines the effect of students' knowledge of English as a foreign language on their probability of participating in the SWB programme. As mentioned in the previous sections, the research on international mobility showed that the knowledge of English is a highly valuable skill among the middle and upper classes in Brazil. Moreover, students who speak English feel more confident pursuing international mobility because they feel that they can communicate in any country. The variable for foreign language choice on the ENEM exam is used as a proxy of knowledge of a foreign language.

6.1 Effect of Students' Socioeconomic Characteristics

Table 18 shows the estimates and standard errors for the probit regression models predicting the likelihood of participating in the SWB programme. Model 1 includes indicator variables for the year in which the ENEM exam was performed as well as variables for students' socioeconomic characteristics. Model 2 also adds the variable for students' Mathematics test score.

The Akaike's Information Criterion (AIC) is used to compare the models. The AIC measures a model's lack of fit and the penalty for complex models. The smaller the AIC value, the better the model is.

In the model considering only students' socioeconomic characteristics (model 1), students who took the ENEM exam between 2010 and 2013 were less likely to participate in the SWB undergraduate programme when compared to students who took the ENEM in 2009. After controlling for Mathematics test scores on the ENEM exam (model 2), students who took the ENEM in 2009 continued to be more likely to participate in the SWB programme when compared to students who took the test in later years.

Female students were less likely to participate in the SWB programme when compared with male students. This result might be explained by the gender gap in STEM degrees. Women have been historically underrepresented in STEM fields of study (Miyake et al., 2010; Wang and Degol, 2016), which are the areas of knowledge covered by the SWB programme. After controlling for Mathematics

Table 18: Estimates and Standard Errors (S.E.) for Probit Regression Models Predicting the Likelihood of Participating in the SWB Programme on Students' Socioeconomic Characteristics and Mathematics Test Scores.

	Model 1			Model 2		
	Estimates		S.E.	Estimates		S.E.
(Intercept)	-1.812	***	(0.005)	-2.485	***	(0.008)
Year of the ENEM (Ref.: 2009)						
2010	-0.157	***	(0.005)	-0.122	***	(0.005)
2011	-0.382	***	(0.006)	-0.407	***	(0.006)
2012	-1.031	***	(0.009)	-1.038	***	(0.009)
2013	-0.899	***	(0.008)	-0.954	***	(0.008)
Female	-0.147	***	(0.004)	0.000		(0.004)
Race (Ref.: White)						
Undeclared	0.107	***	(0.011)	0.090	***	(0.012)
Black	-0.092	***	(0.009)	0.006		(0.010)
Pardo (Mixed-race)	-0.031	***	(0.005)	0.022	***	(0.005)
Asian	-0.001		(0.012)	-0.073	***	(0.012)
Indigenous	-0.109	*	(0.043)	-0.035		(0.045)
Parental Education (Ref.: Neither Have a H.E. Degree)						
One Has H.E. Degree	0.181	***	(0.005)	0.109	***	(0.005)
Both Have H.E. Degree	0.252	***	(0.006)	0.129	***	(0.006)
Family Income (Standardized)	0.064	***	(0.002)	0.006	**	(0.002)
Mathematics Test Score (Standardized)				0.428	***	(0.003)
Number of Cases	2,373,539			2,373,539		
AIC	419,142			395,418		

Notes:

a. Signif. Codes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

b. The AIC value for the null model is equal to 473,627.

c. All the probit regression assumptions were met.

test scores, however, there was no statistically significant difference at five per cent significance level in the likelihood of participating in the SWB programme based on students' gender. In other words, after considering students' achievement, the gender effect is overcome by merit-selective effects.

Students who did not declare their race were more likely to participate in the SWB programme when compared to students who self-reported being white. Students

who self-reported being black, *pardo* (mixed-race), and indigenous were less likely to receive an SWB undergraduate scholarship when compared to students who self-reported as white. These results followed the expected pattern in the literature regarding racial inequalities in Brazilian education: white students have a persistent educational advantage over minority students (Martelo, 2012). After controlling for Mathematics test scores in the ENEM exam, students who did not declare their race and students who self-reported being *pardo* were more likely to receive a SWB scholarship when compared to white students, while students who declared being Asian were less likely to participate in the SWB programme when compared to white students. Therefore, achievement, measured by Mathematics test score, seemed to reduce racial inequality regarding the likelihood of participating in the SWB programme for *pardo* students, and to increase it for Asian students.

Students who have one or both parents with a higher education degree were more likely to be awarded with an SWB undergraduate scholarship when compared to students with neither parent having a higher education degree. The coefficients for parental education decreased after controlling for Mathematics test scores, but they remained positive and significant, at five per cent significance level. In other words, students whose parents were more highly educated were more likely to participate in the SWB programme, even after considering students' Mathematics test score. Last, students with a higher family income were more likely to participate in the SWB programme. After controlling for Mathematics

test scores, the coefficient decreased, but remained positive and significant at five per cent significance level. These results are consistent with the existing research on international mobility and persistent inequalities. Both theoretical approaches indicate that students from higher socioeconomic backgrounds are more likely to pursue international mobility or a distinct educational trajectory such as international mobility.

The estimate for Mathematics test score was positive and significant at five per cent significance level. In other words, students with higher test scores were more likely to participate in the SWB programme. This association was expected, since students who participated in the SWB programme were required to be enrolled in the STEM field of studies.

The AIC value showed that the model which included the variable for students' Mathematics test score (AIC = 395,418) is better than the model which included only students' socioeconomic characteristics (AIC = 419,142). Nevertheless, both models were better when compared to the model without any explanatory variables (null model) (AIC = 473,627).

Figure 11 presents the predicted probability of students participating in the SWB for male students who self-declared as white and took the ENEM in 2009, by family income and parental education. The predicted probability was calculated, taking into account the estimates on the probit regression model which predicted the likelihood of participating in the SWB programme on students' socioeconomic characteristics (model 1). For this group of students, the probability of partici-

pating in the SWB programme was higher if both the students' parents have a higher education degree, and higher for students with higher family income.

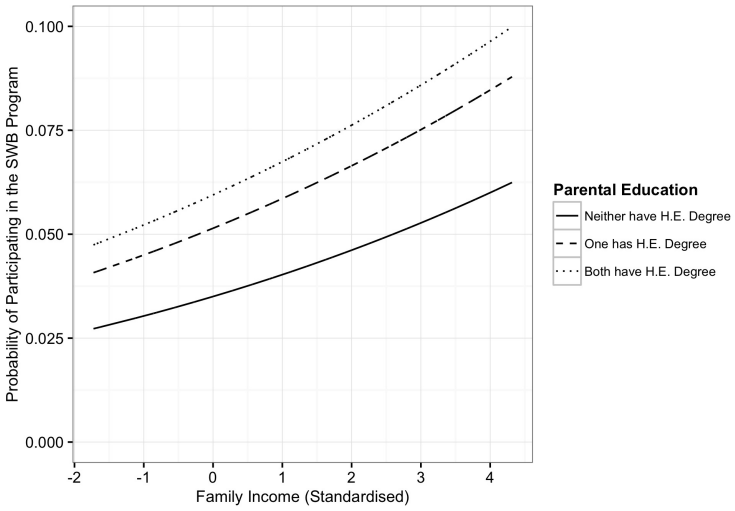


Figure 11: Predicted Probability of Participating in the SWB Programme by Family Income and Parental Education for a White Male Who Performed the ENEM in 2009.

Figure 12 shows the predicted probability of students participating in the SWB for male students who self-declared as white and took the ENEM in 2009, by family income and parental education, after controlling for Mathematics test scores (model 2). Students whose parents both have a higher education degree and who have higher family income continued to be more likely to participate in the SWB programme. However, the predicted probability was much smaller when compared to Figure 11.

In summary, the probit model showed that students from more privileged socioeconomic backgrounds were more likely to participate in the SWB programme. After controlling for Mathematics test score, the effect of students' socioeconomic characteristics on the probability of participating in the SWB programme

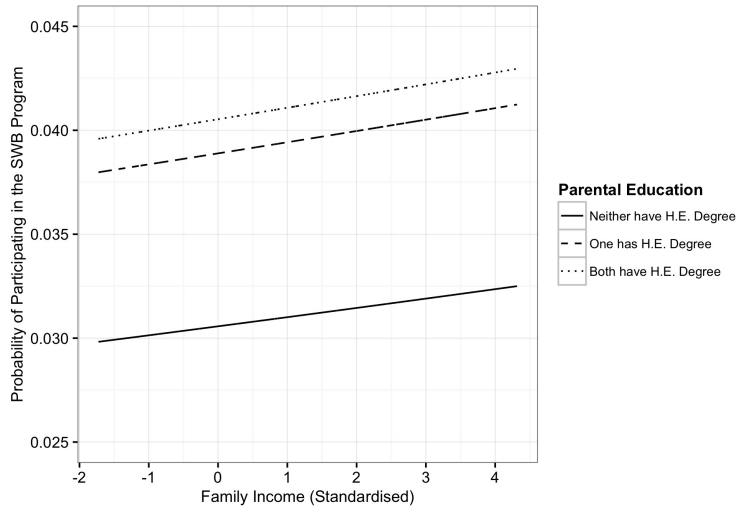


Figure 12: Predicted Probability of Participating in the SWB Programme by Family Income and Parental Education for a White Male Who Performed the ENEM in 2009 With an Average Mathematics Score.

was smaller, but still statistically significant. Following this, interaction terms between students' background characteristics (gender, race, parental education and family income) and Mathematics test scores were added to the probit regression models. These models aimed to further understand the effects of Mathematic test scores on the probability of participating in the SWB programme across different backgrounds.

Table 19 presents the probit regression models predicting the likelihood of participating in the SWB programme with interactions for gender and Mathematics test score, and race and Mathematics test score.

Model 3 took into account differences in gender with respect to Mathematics test score effects on likelihood of participating in the SWB programme. After adding the interaction term for gender and Mathematics test score, the model's AIC was smaller than the AIC for the probit model on students' socioeconomic

Table 19: Estimates and Standard Errors (S.E.) for Probit Regression Models Predicting the Likelihood of Participating in the SWB Programme on Students' Socioeconomic Characteristics and Mathematics Test Score (MTS) With Interaction Terms for Female and MTS and Race and MTS.

	Model 3			Model 4		
	Estimates		S.E.	Estimates		S.E.
(Intercept)	-2.502	***	(0.009)	-2.484	***	(0.009)
Year of the ENEM (Ref.: 2009)						
2010	-0.122	***	(0.005)	-0.122	***	(0.005)
2011	-0.407	***	(0.006)	-0.408	***	(0.006)
2012	-1.037	***	(0.009)	-1.038	***	(0.009)
2013	-0.954	***	(0.008)	-0.955	***	(0.008)
Female	0.031	**	(0.011)	0.000		(0.004)
Race (Ref.: White)						
Undeclared	0.090	***	(0.012)	-0.071	*	(0.034)
Black	0.006		(0.010)	-0.016		(0.022)
Pardo (Mixed-race)	0.022	***	(0.005)	0.015		(0.012)
Asian	-0.073	***	(0.012)	0.109	***	(0.031)
Indigenous	-0.035		(0.045)	0.200	*	(0.091)
Parental Education (Ref.: Neither Have a H.E. Degree)						
One Has a H.E. Degree	0.109	***	(0.005)	0.109	***	(0.005)
Both Have a H.E. Degree	0.128	***	(0.006)	0.128	***	(0.006)
Family Income (Standardised)	0.006	**	(0.002)	0.006	**	(0.002)
MTS (Standardised)	0.436	***	(0.004)	0.428	***	(0.004)
Female x MTS	-0.017	**	(0.005)			
Race x MTS (Ref.: White x MTS)						
Undeclared x MTS				0.082	***	(0.016)
Black x MTS				0.014		(0.013)
Pardo x MTS				0.004		(0.006)
Asian x MTS				-0.089	***	(0.014)
Indigenous x MTS				-0.148	**	(0.052)
Number of Cases	2,373,539			2,373,539		
AIC	395,411			395,352		

Notes:
a. Signif. Codes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
b. The AIC value for the null model is equal to 473,627.
c. All the probit regression assumptions were met.

characteristics and math test score (model 2) (AIC = 395,411). The estimate for the interaction between female and Mathematics test score was negative and significant, at five per cent significance level ($\beta = -0.017, p < 0.01$). Gender difference (the negative interactive effect in model 3, along with the positive effect of 'female' in this model) regarding the probability of participating in the SWB programme was lower for students with higher Mathematics test scores,

and higher for students with lower Mathematics test scores. In other words, at high attainment, the gender effect is overcome by merit-selective effects.

Model 4 included the interaction terms for students' race and Mathematics test score. After including these terms, the model was better compared to model 2 (AIC = 395,352). The estimates for the interaction between race and Mathematics test score were positive and significant, at five per cent level for students who did not declare their race ($\beta = 0.082, p < 0.001$), and negative and significant at five per cent level for Asian ($\beta = -0.089, p < 0.001$) and indigenous ($\beta = -0.148, p < 0.01$) students. Therefore, for students who did not declare their race, the higher their Mathematics test score, the more likely they were to participate in the SWB programme when compared to students who self-declared as white. For students who self-declared as Asian or Indigenous, the race difference was lower for students with higher Mathematics test scores and higher for students with lower Mathematics test scores.

Table 20 shows the interaction term between parental education level and Mathematics test score and between family income and Mathematics test score. The estimates for these interactions were also significant, at five per cent significance level, and negative. Therefore, the effects of higher Mathematics test scores were smaller at higher levels of parental education than at lower levels. Last, the effects of higher Mathematics test scores were also smaller at higher family incomes.

In conclusion, the addition of interaction terms shows that the effect of the so-

Table 20: Estimates and Standard Errors (S.E.) for Probit Regression Models Predicting the Likelihood of Participating in the SWB Programme on Students' Socioeconomic Characteristics and Mathematics Test Scores (MTS).

	Model 5			Model 6		
	Estimates		S.E.	Estimates		S.E.
(Intercept)	-2.501	***	(0.009)	-2.502	***	(0.009)
Year of the ENEM (Ref.: 2009)						
2010	-0.122	***	(0.005)	-0.122	***	(0.005)
2011	-0.408	***	(0.006)	-0.407	***	(0.006)
2012	-1.038	***	(0.009)	-1.038	***	(0.009)
2013	-0.955	***	(0.008)	-0.954	***	(0.008)
Female	0.000		(0.004)	0.000		(0.004)
Race (Ref.: White)						
Undeclared	0.090	***	(0.012)	0.090	***	(0.012)
Black	0.006		(0.010)	0.007		(0.010)
Pardo (Mixed Race)	0.022	***	(0.005)	0.022	***	(0.005)
Asian	-0.072	***	(0.012)	-0.072	***	(0.012)
Indigenous	-0.035		(0.045)	-0.034		(0.045)
Parental Education (Ref.: Neither Have a H.E. Degree)						
One Has a H.E. Degree	0.137	***	(0.013)	0.107	***	(0.005)
Both Have a Higher Education Degree	0.158	***	(0.014)	0.127	***	(0.006)
Family Income (Standardised)	0.006	**	(0.002)	0.020	***	(0.004)
Mathematics Test Score (Standardised)	0.438	***	(0.004)	0.438	***	(0.004)
Parental Education x MTS (Ref.: Neither Have a Higher Education(H.E.) Degree x MTS)						
One Has a H.E. Degree x MTS	-0.016	*	(0.007)			
Both Have a H.E. Degree x MTS	-0.016	*	(0.007)			
Family Income x MTS				-0.007	***	(0.002)
Number of Cases	2,373,539			2,373,539		
AIC	395,414			395,408		

Notes:
a. Signif. Codes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
b. All the probit regression assumptions were met.

cioeconomic characteristics varied in accordance with students' Mathematics test scores on the ENEM exam. The estimates for the interaction terms demonstrated two different effects: (1) for lower achieving students, there was a greater effect from students' background than for high achieving students; and (2) for high achieving students, there was a weaker effect from background than for lower achieving students. These results suggest that students with a more advantageous background (male, white, with both parents higher educated and high family income) and lower Mathematics test scores had ways of being selected to

the SWB programme that did not depend entirely on their previous attainment. For higher achieving students, there is a suggestion that participation in the SWB programme was more meritocratic. This finding resonates with the results found in the social mobility research, which tries to understand the role of education in the process of intergenerational social mobility (e.g. Vallet 2004; Breen and Jonsson 2005; Iannelli and Paterson, 2007). This research show that at higher levels of education, the association between class of origin and class of destination is weaker.

Appendix E presents the probit regression models by year in which the student took the ENEM exam. Despite a similar association between the variables for students' socioeconomic characteristics and the probability of participating in the SWB programme in the model presented above, there is some suggestion that the effects of students' socioeconomic characteristics were smaller in the more recent years of the ENEM. Because of data limitations, this research cannot test whether these differences between years of the ENEM can be explained by the increasing expansion of Brazilian higher education or by unofficial affirmative action attitudes during the selection process for the SWB programme. Future research should investigate these changes in the effect of students' socioeconomic characteristics and the likelihood of participating in the SWB by year of the ENEM.

Appendix F shows the probit regression model estimates to predict the likelihood of participation in the SWB programme based on students' socioeconomic

characteristics, using the ENADE dataset. The effect of students' socioeconomic characteristics on the probability of participating in the SWB programme was consistent with the effect found in model 1 (estimates with the same significance at five per cent level in the same direction). Female students were less likely to participate in the SWB programme. Students who self-declared as back, pardo, or indigenous were less likely to participate in the programme when compared to white students. Students who had one or both parents with a higher education degree were more likely to receive an SWB scholarship. Last, students with a higher family income were more likely to participate in the programme. These results validated the results found on the probit regression models using the ENEM dataset.

6.2 Effect of Knowledge of a Foreign Language

Table 21 presents the estimates and S.E. for the probit models predicting the probability of participating in the SWB programme, including an indicator variable for students who chose English as their foreign language on the ENEM exam. The information regarding foreign language choice on the ENEM exam was not available for students who took the ENEM in 2009. Therefore, these models only comprised students who took the ENEM between 2010 and 2013.

Students who sat for an English test for the ENEM exam were more likely to participate in the SWB programme when compared with students who sat for a Spanish test for the ENEM exam. This result supports the literature which

Table 21: Estimates and Standard Errors (S.E.) for Probit Regression Models Predicting the Likelihood of Participating in the Swb Programme on Students' Socioeconomic Characteristics, Math Test Scores and Foreign Language Choice in the ENEM Exam.

	Model 7			Model 8		
	Estimates		S.E.	Estimates		S.E.
(Intercept)	-2.116	***	(0.007)	-2.761	***	(0.009)
Year of the ENEM (Ref.: 2010)						
2011	-0.234	***	(0.006)	-0.296	***	(0.006)
2012	-0.883	***	(0.009)	-0.929	***	(0.009)
2013	-0.756	***	(0.008)	-0.854	***	(0.008)
Female	-0.135	***	(0.005)	0.002		(0.005)
Race (Ref.: White)						
Undeclared	0.119	***	(0.012)	0.093	***	(0.012)
Black	-0.037	***	(0.011)	0.046	***	(0.011)
Pardo (Mixed-race)	0.008		(0.006)	0.049	***	(0.006)
Asian	-0.013		(0.015)	-0.095	***	(0.015)
Indigenous	-0.084		(0.054)	-0.020		(0.056)
Parental Education (Ref.: Neither Have a H.E. Degree)						
One Has H.E. Degree	0.150	***	(0.006)	0.085	***	(0.006)
Both Have H.E. Degree	0.202	***	(0.007)	0.095	***	(0.007)
Family Income (Standardized)	0.047	***	(0.002)	-0.006	**	(0.002)
Foreign Language Choice in the ENEM (Ref.: Spanish)						
English	0.258	***	(0.006)	0.182	***	(0.006)
Mathematics Test Score (Standardized)				0.457	***	(0.004)
Number of Cases	2,024,075			2,024,075		
AIC	293,421			278,076		

Notes:

a. Signif. Codes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

b. The AIC value for the null model is equal to 320,867.

c. All the probit regression assumptions were met.

shows the importance of fluency in English for international mobility (Windle and Nogueira, 2015).

After including the indicator variable for students who sat for English, the effect of the students' socioeconomic characteristics on the probability of participating in the SWB programme is similar to the model presented above (model 1). Students who took the ENEM after 2010 were less likely to participate in the SWB programme. Female students were also less likely to participate in the SWB programme when compared with male students. Students who did not declare their race were more likely and students who self-declared as black were less likely to receive an SWB scholarship when compared with students who self-declared as white. Students who had at least one parent with a higher education degree were more likely to participate in the SWB programme when compared with students whose parents had not received higher education. Last, students with higher family incomes were more likely to participate in the programme. Figure 13 shows the predicted probability of receiving a SWB scholarship by family income and foreign language choice for students who took the ENEM in 2010, self-declared being white, and had two parents with a higher education degree.

After controlling for Mathematics test score and foreign language choice on the ENEM exam, however (model 8), there was no gender difference in the probability of participating in the SWB programme. The estimates for students who self-declared as black and pardo were positive and significant, at five per cent significance level. In other words, after controlling for Mathematics test scores

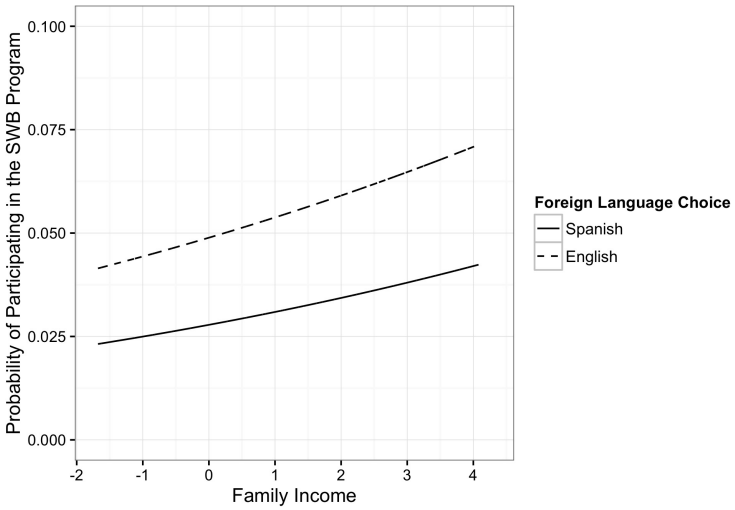


Figure 13: Predicted Probability of Participating in the SWB Programme by Family Income and Foreign Language Choice in the Enem for a White Male, Who Has Both Parents With a H.e. Degree, and Who Performed the ENEM in 2010.

and foreign language choice on the ENEM exam, these students were more likely to participate in the SWB programme when compared with white students. Last, students whose families had higher incomes were less likely to participate in the SWB programme. The effect of family income on the probability of participating in the SWB programme, however, is very small ($\beta = -0.006$)[22].

[22]The income variable has been standardised, so that the value of this coefficient is not merely a consequence of units of measurement of income.

Chapter 7

7 Findings II

This chapter presents the results for the research question regarding inequality within the SWB programme. The research question analysed in this section is:

RQ2. Is there a relationship between students' socioeconomic characteristics and the prestige of the university of destination within the SWB programme?

As discussed in the data section, the mean ranking position for the universities of destination during the SWB programme between 2011 and 2014 in the three best known world university rankings – ARWU, QS and THE – was used as a measure of prestige. The results for the variance component models and random intercept models are presented in the following section. The variance component model demonstrates how much of the variation can be associated with the grouping, in this case, by Brazilian higher education institutions (Goldstein, 2011). This model does not adjust for any explanatory variables. The second model comprises the random intercept model with variables for students' socioeconomic characteristics, Mathematics test scores on the ENEM exam, and areas of knowledge pursued during the SWB programme[23]. The third model comprises the

[23]The variable for students' race was not statistically significant. For that reason, it was excluded for the models. Appendix G shows the models with the variable for race for each international university ranking.

random intercept model with variables for students' socioeconomic characteristics, Mathematics test scores on the ENEM exam, area of knowledge pursued during the SWB programme, and Brazilian higher education institutions' contextual variables. The fourth model includes the variable for students' choice of foreign language on the ENEM exam. The coefficients for the models were very similar for all three rankings. To avoid repetition, only the results for the QS ranking, which has the higher number of cases, are presented below. The results for the ARWU and THE rankings are presented in Appendix H.

The relationship between the prestige of the Brazilian higher education institution and the prestige of the university of destination during the SWB programme was also investigated. The purpose of this investigation was to test whether students who attend prestigious universities in Brazil would attend prestigious universities during the SWB programme. The prestige of the university of destination was measured using the world university ranking discussed in previous chapters. However, between 2011 and 2014, only ten Brazilian higher education institutions appeared in those rankings. Therefore, to measure the prestige of Brazilian higher education institutions, the national ranking performed by Folha de São Paulo, a national newspaper, was used. The national ranking was created in 2012 and took into consideration the methodologies used in the world university rankings. The models showed that there was no significant association between the prestige of the Brazilian higher education institution and prestige of university of destination in the SWB programme. However, because of fairly recent

introduction and, consequently, the lack of validation of the national ranking, the models analysing the association between the prestige of the Brazilian higher education institutions and the prestige of the university of destination during the SWB programme are not presented in this thesis. Moreover, the random intercept models presented below already take into account differences in Brazilian higher education institutions.

7.1 Random Intercept Models

Table 21 shows the multilevel models analysing the association between the prestige of the university of destination during the SWB programme and students' socioeconomic characteristics, regarding the mean standardised ranking position in the QS ranking between 2011 and 2014. Model 1 shows the results for the variance component model, which does not include any explanatory variables. The level-2 variance, attributed to differences in Brazilian higher education institutions, (σ^2_{u0}) is equal to 0.031, while the level-1 variance, attributed to students' characteristics, (σ^2_{e0}) is equal to 1.153. The variance partitioning coefficient (VPC) shows the proportion of the variance which can be attributed to differences in Brazilian higher education institutions. In model 1, 2.62 per cent of the variance in prestige of university of destination during the SWB programme can be explained by such differences.

The second model presents the effect of students' characteristics on the prestige of the university of destination during the SWB programme. While there was no

Table 22: Estimates and Residual Variance for Two-level Regression Models Predicting the Mean Standardised QS Ranking of the University of Destination During the SWB Programme.

	Model 1			Model 2			Model 3			Model 4		
	Est.		S.E.	Est.		S.E.	Est.		S.E.	Est.		S.E.
Fixed Part												
(Intercept)	0.063	***	(0.011)	-0.372	***	(0.046)	-0.247	***	(0.058)	-0.591	***	(0.079)
Female				-0.095	***	(0.023)	-0.102	***	(0.023)	-0.067	*	(0.029)
Parental Education (Ref.: Neither Have a H.E. Degree)												
One Has H.E. Degree				0.049		(0.031)	0.050		(0.031)	0.054		(0.039)
Both Have H.E. Degree				0.113	***	(0.031)	0.108	***	(0.031)	0.076		0.(039)
Family Income (Standardised)				0.045	***	(0.010)	0.043	***	(0.010)	0.031	**	(0.011)
Mathematics Test Score (Standardised)				0.141	***	(0.015)	0.110	***	(0.016)	0.140	***	(0.023)
SWB Area of Knowledge (Ref.: Engineering)												
Agricultural Sciences				0.020		(0.058)	-0.010		(0.058)	0.083		(0.076)
Applied Social Sciences				-0.708	***	(0.040)	-0.708	***	(0.040)	-0.692	***	(0.049)
Biological Sciences				0.247	***	(0.041)	0.205	***	(0.041)	0.273	***	(0.052)
Exact and Earth Sciences				0.170	***	(0.032)	0.157	***	(0.032)	0.182	***	(0.040)
Health Sciences				0.047		(0.037)	0.050		(0.037)	0.106	*	(0.048)
Human Sciences				-0.025		(0.303)	-0.047		(0.301)	0.317		(0.515)
Linguistic, Literature and Arts				-0.557	***	(0.140)	-0.555	***	(0.139)	-0.679	***	(0.173)
Technologies				0.445		(0.291)	0.540		(0.290)	0.947		(0.516)
Other Areas				0.143	*	(0.062)	0.133	*	(0.061)	0.112		(0.077)
English										0.374	***	(0.042)
Public Higher Education Institution							-0.042		(0.042)	-0.042		(0.050)
Higher Education Institution's Number of Staff (Standardised)							0.034	***	(0.006)	0.028	***	(0.008)
Region of Brazil Where H.E. Institution Is Located (Ref.: Southeast)												
Central-West							-0.030		(0.047)	-0.063		(0.057)
Northeast							-0.178	***	(0.030)	-0.180	***	(0.036)
North							-0.297	***	(0.086)	-0.334	***	(0.100)
South							0.033		(0.030)	-0.020		(0.038)
Random Part												
σ^2_{u0}	0.031		(0.028)	0.024		(0.026)	0.003		(0.025)	0.000		(0.000)
σ^2_{e0}	1.153		(0.033)	1.070		(0.030)	1.079		(0.029)	1.059		(0.019)
-2*loglikelihood	29,076.4			28,312.8			28,204.0			17,528.1		
VPC	2.62%			2.19%			0.28%			0.00%		
Number of Brazilian Higher Education Institutions	76			76			76			76.00		
Number of Students	9,671			9,671			9,671			6,055		

Notes:
a. Signif. Codes: * p < 0.05, ** p < 0.01, *** p < 0.001;
b. Likelihood ratio tests indication that the random intercept variance of Model 1, 2, and 3 are significant at the 5% level. Model 4 was compared to the Variance Component model for the same sample of Model 4.
c. Appendix I presents the residual of the distribution of level-2 residuals for Model 2, 3 and 4.

difference in the probability of participating in the SWB programme by gender after controlling for Mathematics test score (Model 2 in Table 18 on the Findings I chapter), the random intercept model shows that female students tended to study in a lower QS ranked university when compared to male students. The effect of gender on the prestige of university of destination was also negative in the models for the ARWU and THE rankings. Therefore, despite having the same likelihood of participating in the programme than male students, female students were studying in a less prestigious university during the SWB programme.

Social psychology demonstrated that negative stereotype associated with certain groups has an effect on academic performance (Stelle, 2010). The STEM field of studies, which are historically male-dominated disciplines, have a high reputation of being a hostile environment for female students (e.g.: Stelle (2010) found that female students feel more discriminated in male-dominated disciplines when compared to female students in other disciplines). Moreover, the stereotype that women are bad in Science and Mathematics is still present in society (Beasley and Fischer, 2011). Therefore, female students might be impacted by the anxiety caused by the expectation of being judged based on the group stereotype and might have decided not to apply for high prestigious universities during the programme.

However, further research should use in-depth interviews with female students participating in international mobility programme to try to confirm whether they apply to less prestigious universities because of stereotype threat or whether there

is a more objective explanation for female students applying for less prestigious universities. For example, prestigious universities participating in the SWB programme were more likely to select male students. Unfortunately, the dataset available to analyse students participating in the SWB programme did not allow to further investigation on gender inequalities regarding university of destination during the SWB programme.

Students' parental education and family income were positively associated with the mean standardised QS rankings. In other words, students whose both parents have a higher education degree tended to study at a university with a higher position in the QS ranking when compared to students whose parents did not have a higher education degree. Also, students with higher family income tended to study at a higher QS ranked university during the SWB programme. Therefore, students with more advantageous socioeconomic background (higher parental education and higher family income) tended to study in a more prestigious university during the SWB programme. The finding corroborates with the results found by Netz and Finger (2016) regarding international mobility during higher education expansion in Germany. They showed that students from higher socioeconomic backgrounds (measured by parental education) tended to pursue more distinct types of international mobility programmes (longer stays and more prestigious scholarships). Students with higher Mathematics test score also tended to study in a more prestigious university during the SWB programme after controlling for students' socioeconomic backgrounds.

In order to control for areas of knowledge in the SWB programme, students in Engineering were used as the reference group since they represent the largest group (around 50 per cent of the students participating in the SWB programme were in Engineering). Students of Biological Sciences, Exact and Earth Sciences, and other areas of knowledge tended to study in a higher QS ranked university during the SWB programme when compared with students of Engineering. While students of Applied Social Sciences, Linguistics, Literature, and Arts tended to study in a lower QS ranked university when compared with students of Engineering. Similar results were found for the ARWU and THE rankings. As discussed in Appendix C, world university rankings tend to favour universities with strong Hard Science (such as Biological, Health and Exact and Earth Sciences) departments and disfavour universities with a strong Soft Science departments (such as Human and Applied Social Sciences). Consequently, students in the Hard Science attended more prestigious universities while students in the Soft Sciences attended less prestigious universities when compared to students in Engineering.

As expected, the association between the prestige of the university of destination during the SWB programme and students' Mathematics test score was positive and significant at 5 per cent significance level. In other words, students with high Mathematics test score in the ENEM exam tended to study in a more prestigious university during the SWB programme. After controlling for students' socioeconomic characteristics, Mathematics test scores on the ENEM and areas of study in the SWB programme, the variance between higher education institutions

drops (from 2.62 per cent to 2.19 per cent). This shows that the variance can be partially explained by students' characteristics.

The third model includes contextual variables for the Brazilian higher education institutions. The number of staff was used as a proxy for the size of the higher education institutions. The effect of the number of staff on the prestige of the university of destination during the SWB programme was positive and significant. In other words, students who attend a larger Brazilian higher education institution tended to study in a more prestigious higher education institution during the SWB programme. Students in larger higher education institution might receive more information (formally or informally) about the SWB programme.

Students who attended higher education institutions located in the North and Northeast regions were less likely to study at a higher QS ranked university when compared to students who attended courses in the Southeast of Brazil. As discussed in Chapter 2, Brazil is divided into five official regions. The Southeast of Brazil, the reference category in the model, is the richest (around 55 per cent of the country's GDP) and more populated region in the country (around 42 per cent of the country's total population). The North represents the poorest and less inhabited region in the country, comprising 4.7 per cent of the country's GDP and 6.2 per cent of the country's total population. The Northeast of Brazil has 12 percent of the country's GDP (third richest) and 29 per cent of the total population (second highest population), but it is the region with the low-

est Inequality-adjusted Human Development Index (IHDI)[24]. Therefore, students from the poorest and more unequal regions of Brazil tended to go to less prestigious university during the SWB programme when compared to the students from the richest region of the country.

Last, the fourth model for the mean standardised score QS ranking shows that students who chose English as a foreign language in the ENEM exam tended to study at higher-ranked universities during the SWB programme when compared with students who chose Spanish as a foreign language. In contrast to the previous models, there was no difference in the prestige of the university of destination based on students' parental education. In this model, there was no remaining variance to be explained at level two.

In summary, students from privileged socioeconomic backgrounds were more likely to study at a more prestigious university during the SWB programme, independently of the measure of prestige used (ARWU, QS or THE ranking). Students with higher family income and higher educated parents, as well as students who chose English as a foreign language on the ENEM exam, tended to study at a more prestigious university during the SWB programme. Nevertheless, in all random intercept models, female students tended to study at a lower ranking university. Moreover, only little of the variance in the prestige of the university of destination during the SWB programme can be explained by dif-

[24]THE IHDI is an extension of the Human Development Index. In addition to considering life expectancy, education, and per capita income indicators, the IHDI considers measures of inequality.

ferences in higher education institutions for all three rankings. In other words, the Brazilian higher education institution do not explain differences in students' choice of destination during the SWB programme.

Figure 14 shows the predicted mean standardised ranking against family income, after controlling for sex, parental education, Mathematics test scores on the ENEM exam, area of knowledge in the SWB programme, and Brazilian institution characteristics. For all world university rankings, the higher the income, the higher the mean standardised ranking position of the university of destination during the SWB programme.

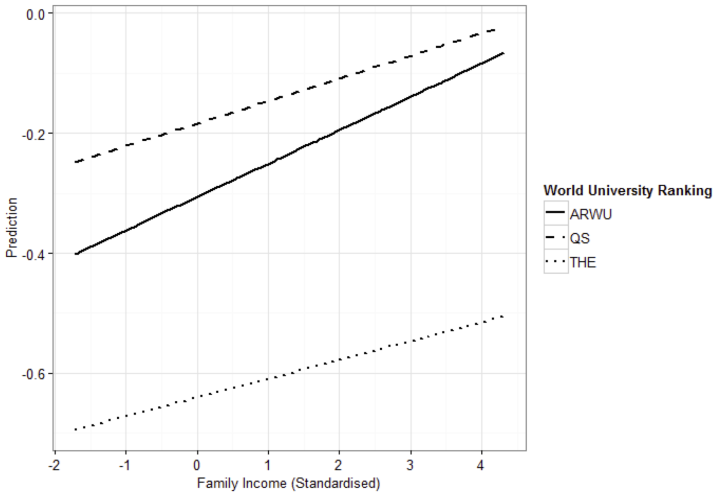


Figure 14: Predicted Prestige of University of Destination During the SWB Programme by World University Ranking and Family Income for a White Male Student, Who Both Parents Have a Higher Education Degree, With an Average Mathematics Test Score in the ENEM Exam, in the Engineering Area of Knowledge in the SWB Programme, Enrolled in a Public H.E. Institution, With an Average Number of Staff, and Located in the Southeast of the Country.

Chapter 8

8 Discussion

This thesis analysed an educational policy implemented in a unique period of Brazilian politics and for the Brazilian economy. After a long period of economic recession and political instability, Brazil became a new world power. As discussed in the background chapter, three policies, implemented between the mid-1990s and the first decade of the 2000s, helped Brazil achieve universal coverage for primary education and increase enrolment rates in secondary education. In higher education, Brazilian universities started implementing affirmative action policies to increase the number of disadvantaged students enrolled in the prestigious, tuition-free public universities. In 2007, the Brazilian government created a programme aiming to expand the number of places in federal universities and open new institutions in remote regions of the country. In 2012, it was established that 50 per cent of the places in federal universities would be allocated to students who studied in public schools during their upper secondary education.

Research also showed that upper and middle-classes in Brazilian were increasingly pursuing international mobility during upper-secondary and higher education (e.g.: Windle and Nogueira, 2015, Nogueira and Ramos, 2014). The SWB programme was international mobility programme implemented in 2011 by the Brazilian government, and it can be considered an example of policies

implemented during this period of economic and political prosperity. The aim of the programme was to increase Brazilian competitiveness in the global economy through international mobility of undergraduate and graduate students. The SWB programme was one of the most publicised projects of the first mandate of President Dilma Rousseff and it was constantly used as electoral propaganda in her re-election campaign. Throughout the years of the programme, however, the media have frequently reported complaints by the foreign universities and students participating in the programme about late payments and lack of organisation. Since the beginning of the current economic crisis, new scholarships have been suspended due to lack of funds, falling short of the promised 101,000 scholarships. In July 2016, after assuming the office during the impeachment procedures, Michel Temer announced that the programme would not offer any scholarships for undergraduate students and that it would continue with around five thousand scholarships for graduate students.

Considering the period of higher education expansion and the increasing demand for international mobility by upper and middle classes, Brazil is a good case to understand the impact of international mobility on education inequalities. While the majority of the research on international mobility focuses in examining students from Asia, United States and Europe participating in international mobility programme, this research brings attention to organised international student mobility in a Latin America country. It analysed who are the students participating in the programme, how international mobility affect education inequalities and

how the expansion of higher education might result in the creation of other mechanisms to maintain socioeconomic inequalities.

The majority of research on international mobility show that students from more advantageous socioeconomic backgrounds are more likely to study abroad. Despite the ambiguities of the concept of cultural capital, these research argued that middle-class students see international mobility as an opportunity to accumulate a more distinct type of cultural capital. However, some research also showed that students from more disadvantageous socioeconomic background might see international mobility as an alternative route to gain cultural capital. (Brooks and Water, 2011).

The first research question aimed to analyse who were the students participating in the SWB programme, and therefore analyse the inequality in access to the programme. Incorporating the literature review on international mobility and persistent inequality, two hypotheses were developed to answer the first research questions. The first hypothesis considered that international mobility might be a mechanism of upward mobility and, therefore, students from lower socioeconomic background would be more likely to participate in the SWB programme. In contrast, the second hypothesis assumed that international mobility might be a mechanism for maintaining educational inequalities after a period of expansion of education; therefore, students from higher socioeconomic backgrounds would be more likely to participate in the programme.

Acquiring the dataset for the students participating in the SWB programme

entailed negotiating with three different institutions (the two funding bodies of the SWB programme and the INEP) which took around a year and a half. Moreover, because the dataset comprised all students who took the ENEM between 2009 and 2013 (more than 30 million students), a lot of time was spent arranging the datasets and checking for selection bias. To answer the first research question, only students who performed all tests, scored 600 points or more on the ENEM exam, and were between sixteen and thirty-two years old at the time of the exam were selected for the analysis. After applying the selection criteria, the socioeconomic characteristics of the students selected in the ENEM dataset were then compared to the socioeconomic characteristics of students finishing higher education within the country using the ENADE dataset. Students selected for the control group of the analysis (students who took the ENEM but did not receive a SWB scholarship) were from a more privileged socioeconomic background when compared to students finishing higher education who did not participate in any international mobility programme during their undergraduate degree. Therefore, the results of the models analysing inequality in access to the SWB programme might underestimate the effect of students' socioeconomic characteristics on the likelihood of receiving a SWB scholarship.

Following the research on persistent inequality, international mobility was considered a transition within the higher education level. Probit regression models were used to analyse the association between students' socioeconomic background and the likelihood of participating in the SWB programme. The estimates from the

probit regression models showed that students from a more privileged socioeconomic background were more likely to participate in the international mobility programme, corroborating the second hypothesis. The same effect was found using the ENADE dataset, which contains a small sample of students who participated in the SWB programme and finished their undergraduate studies in 2013 or 2014.

Similar association between students' socioeconomic background and the probability of studying abroad was found in studies performed with undergraduate students in the UK (Findlay, 2006), undergraduate and master students in Austria, Germany, Switzerland, and the Netherlands (Netz, 2015), undergraduate students in the United States (Salisbury, 2008) and in Germany (Netz and Finger, 2016) as well as students participating in the Erasmus programme (Souto-Otero et al., 2013). These studies also found that students whose parents have higher levels of education and/or occupational status are more likely to aspire to participate in or participate in international mobility programmes. The fact that the SWB programme offered a financial bursary did not reduce the inequality in access to the programme, similar to the findings regarding the South American international mobility programme published by Nogueira and Ramos (2014). The research on persistent inequalities suggested that different destinations in the educational system might be a strategy for avoiding downward mobility or maintaining social and economic prestige during a period of educational expansion. The positive and significant association between the likelihood of participating in the SWB

programme and students' socioeconomic background suggests that international mobility in higher education might be one strategy used by the Brazilian middle and upper classes to maintain their prestige. For these students, the expected benefits (such as better labour market prospects and proficiency in a foreign language) are higher than the costs (such as distance from family and friends and academic delays) of studying abroad.

The interaction terms verify that students from more advantageous socioeconomic backgrounds might pursue international mobility in order to maintain educational advantages. For low achieving students, the effect of the socioeconomic background was higher, while for high achieving students, the effect of the socioeconomic background was lower. Therefore, while for high achieving students the SWB programme is merit-selective, low achieving students with more advantageous socioeconomic backgrounds find ways to pursue international mobility that do not entirely depend on merit.

These results have important consequences for social inequality in Brazil when we take into consideration the research which analyses the impact of international mobility on labour market prospects and on social status. Such research has shown that students from more disadvantageous socioeconomic backgrounds benefit more from international mobility since they can acquire skills that are not transmitted from their families. Therefore, the Brazilian undergraduate students who might benefit most from an international mobility programme, such as the SWB programme, to improve their labour market opportunities and secure

occupation status are receiving less access to it.

Another interesting finding from the probit regression model was that, differently from East Asian countries, there was not a difference in gender regarding the probability of participating in the SWB programme. Brook and Waters (2011) showed that in Japan, for example, female student pursue international mobility programme during higher education as an escape from a very patriarchal society. Despite the highly patriarchal structure of Brazilian society, after controlling for attainment, female students had the same chance to participate in the programme when compared to male students.

The probit regression models also showed that students who chose to sit for an English test during the ENEM exam were more likely to participate in the SWB programme when compared with students who chose to sit for a Spanish test. The addition of the variables for foreign language choice and Mathematics test score, however, affected the association of race and of family income with the probability of participating in the SWB programme. After controlling the model for foreign language choice on the ENEM exam, students from racial minority backgrounds (black and *pardo*) were more likely to participate in the SWB programme, and students with higher family income were less likely to participate in the programme. Therefore, the effect of socioeconomic background on the probability of participating in the SWB programme was weaker for students who had a knowledge of English as a foreign language.

The effect of the indicator variable for students who chose English in the foreign

language knowledge based on the likelihood of receiving a SWB scholarship also suggests that it might exist as a constraint regarding foreign language knowledge. The research performed among undergraduate students in the United Kingdom (Findlay et al., 2006), in New Zealand (Doyle et al., 2010), and among undergraduate and master students in Germany, Switzerland and Netherlands (Netz, 2013) also found that proficiency in a foreign language is an important factor when students are planning to study abroad during higher education.

The second research question analysed inequality within the SWB programme. Then, the association between students' socioeconomic background and prestige of the university of destination during the SWB programme was examined. Netz and Finger (2016) showed that students from more privileged socioeconomic backgrounds were more likely to pursue more exclusive types of international mobility, such as more prestigious scholarships, and spend more time abroad. The hypothesis tested in the second research question was whether students from more privileged socioeconomic backgrounds were more likely to study in more prestigious universities during the SWB programme, using the three most renowned world university rankings as a measure of prestige.

It is also important to highlight that students' flow pattern in the SWB programme was very similar to the pattern in East Asian countries: the majority of students went to a university in North America (the United States and Canada) or in Western Europe. Moreover, English speaking countries received the higher number of students. This pattern contributes to the uneven geography of inter-

national student mobility.

Of the two funding bodies, only the CNPq provided the information on students' university of destination during the SWB programme. Therefore, only students who were funded by the CNPq were considered in the analysis. Students who were funded by the CNPq tended to be from an advantageous socioeconomic background when compared to students who were funded by the CAPES. The analysis of inequality within the SWB programme consequently comprises students from more privileged socioeconomic backgrounds even when compared to the overall sample of students participating in the SWB programme.

The random intercept models analysing inequality within the SWB programme showed that students with more highly educated parents, higher family income, higher Mathematics test scores and a choice of English as a foreign language on the ENEM exam tended to study at more prestigious universities during the SWB programme. These models also showed that differences in Brazilian higher education institutions explained little of the variation in the prestige of the university of destination during the SWB programme. The results of the models confirm the third hypothesis, which states that students from privileged socioeconomic backgrounds were more likely to study in a prestigious university during the SWB programme.

However, the random intercept model showed that female students studied in a less prestigious university during the SWB programme when compared to male students. Stereotype threat or other objective factors (such as selection pro-

cess) might explain why female students tend to go to a lower-ranked university when compared to male students. Using focus groups or in-depth interviews, future research should investigate if the negative stereotype associated with female students and the STEM field of studies is the main reason why the association between gender and prestige of university of destination is negative and statistically significant. Moreover, future research should also consider whether objective factors (such as selection process) explain why female students study in a less prestigious university during the SWB programme and whether this trend could also be seen in other student mobility programmes.

Last, the random intercept model showed that Brazilian higher education institutions located in regions with lower socioeconomic resources (North and Northeast) tended to send students to less prestigious universities during the SWB programme. Therefore, this result suggests that SWB programme reproduced regional inequalities in the country by favouring students from richer regions (South and Southeast).

This PhD thesis, therefore, contributes to the literature on international student mobility and the literature on persistent inequality by understanding the effect of international mobility on education inequalities during a period of economic prosperity and expansion of the educational system in Brazil. Similar to the majority of research on international student mobility, it has shown that there is inequality in access and inequality within the programme. In other words, students' socioeconomic background plays an important role, even when attainment is con-

sidered, in participation and destination during the SWB programme. Before this thesis, little was known about the relationship between students' socioeconomic background and international mobility in Latin America. Interestingly, the effect of socioeconomic background and the student flow was similar to the ones found in other developing countries in Asia (e.g.: China, India and South Korea).

This thesis also contributes to the literature on persistent inequality by considering international mobility as one type of transition in the educational system. Therefore, in addition to usual measures of qualitative differences (i.e.: curriculum, type of institution or diploma), research on educational inequalities should also consider how international mobility might be used as a mechanism for maintaining socioeconomic advantages by the middle and upper classes when faced with a period of expansion of the educational system.

Nevertheless, the significant and positive association between international mobility and students' socioeconomic background might also reflect that higher education in Brazil is still very unequal. Despite all the policies aiming to expand the country's higher education level for every student, students from advantageous socioeconomic backgrounds are still more likely to enter higher education. In addition, they are more likely to pursue international mobility during their undergraduate studies. To reduce the association between students' socioeconomic characteristics and the likelihood of participating in an international mobility programme, the Brazilian government should first continue to implement educational policies that aim to reduce the association between students' socioeconomic char-

acteristics and the transition to higher education. Moreover, policies that increase foreign language proficiency for students from disadvantaged socioeconomic backgrounds before entering higher education, as well as the implementation of racial and social affirmative action policies in international mobility programmes, might increase the number of students from lower socioeconomic background pursuing international mobility.

To understand better the effect of international mobility on educational inequalities among Brazilian undergraduate students, future research should understand the motivations that lead students to pursue international mobility. This research might help increase understanding about which factors deter students from lower socioeconomic backgrounds from studying abroad and help create policies that tackle these factors. Also, future research should examine the effect that participating in the SWB programme or other Brazilian international mobility programmes during higher education has on labour market outcomes and social class status. This implies gathering longitudinal data on students in higher education in the country or the inclusion of a variable regarding international mobility in the few longitudinal nationally representative surveys.

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Appendices

Appendix A

Undergraduate Courses Evaluated in the ENADE 2013 and ENADE 2014

In the ENADE 2013, the following undergraduate courses were evaluated: Agronomy, Biomedicine, Physical Education, Nursing, Pharmacy, Physiotherapy, Speech Therapy, Medicine, Veterinary Medicine, Nutrition, Dentistry, Social Work, Zootechnics, Agribusiness, Hospital Management, Environmental Management and Radiology.

In the ENADE 2014, the following undergraduate courses were evaluated: Architecture and Urbanism; Information System; Civil Engineering; Electrical Engineering; Computer Engineering; Control Systems Engineering; Mechanical Engineering; Chemical e Engineering; Food Engineering; Production Engineering; Environmental Engineering; Forestry Engineering; And Engineering.

Appendix B

Differences in Students Test Scores and Socioeconomic Characteristics by Funding Body of the SWB Programme

Of the 48,258 participating in the SWB programme who took all tests, scored 600 points or more in the ENEM exam, and were between 16 and 32 years old, 15,329 students were funded only by the CNPq, 32,691 students were funded only by the CAPES, and 238 students were funded by both funding bodies. This section aimed to investigate whether there was a difference in tests scores and socioeconomic characteristics between students who were funded by CNPq and students who were funded by CAPES. If the difference between the two groups was not statistically significant, the results for students who were funded by CNPq might be extended to students who were funded by CAPES. Moreover, the results might be generalised for all students participating in the SWB programme.

Table 23 shows the mean and standard errors (S.E.) of the standardised tests scores in the ENEM exam by funding body. Since 2009, the ENEM exam is designed using Item Response Theory (IRT). The test scores therefore are comparable between years of the ENEM. The t-tests show that there is a statistically significant difference in the mean test scores between students who were funded by the CNPq and students who were funded by CAPES in all tests in the ENEM exam[25]. Students who were funded by CNPq have a higher mean test scores when compared to students who were funded by CAPES in all test in the ENEM exam.

Table 24 shows the frequency table for students' socioeconomic characteristics

[25]Mathematics Test Scores: $t = 35.21$, $p < 0.001$; Natural Sciences Test Scores: $t = 42.06$, $p<0.001$; Human Sciences Test Scores: $t = 38.92$, $p<0.001$; Language and Codes Test Scores: $t = 42.86$, $p<0.001$; Writing Test Scores: $t = 8.48$, $p<0.001$

Table 23: Mean and standard errors (S.E.) for test scores in the ENEM exam by funding body.

Test in the ENEM exam	CNPq		CAPES	
	Mean	S.E.	Mean	S.E
Mathematics	748.31	0.69	718.48	0.50
Natural Science	674.83	0.53	648.22	0.35
Human Science	686.17	0.49	663.16	0.34
Language and Codes	652.86	0.42	631.08	0.29
Writing	748.17	0.96	738.40	0.64

by funding body of the SWB programme. Chi-square tests show that there are no statistically significant association between between students' sex, parental education and foreign language choice in the ENEM exam and funding body of the SWB programme[26]. The t-test for the difference in the mean family income by funding body in the SWB programme is statistically significant ($t = 40.51, p < 0.001$). Students who were funded by CNPq have a higher family income when compared to students who were by CAPES.

Therefore, there are significant differences between students who were funded by CNPq and students who were funded by CAPES. Students who were funded by CNPq have higher test scores in the ENEM exam and higher family income. For that reason, the results that are presented in this chapter could not be generalised for all students participating in the SWB programme.

[26]Gender: $\chi^2_{(1)} = 0.53, p = 0.77$; Parental Education: $\chi^2_{(2)} = 7.92, p = 0.09$; Language Choice in the ENEM Exam: $\chi^2_{(1)} = 4.25, p = 0.12$.

Table 24: Frequency distribution (in percentage) for students' socioeconomic characteristics by Funding Body of the SWB program.

	Funding Body		
	CNPq	CAPES	Both
Sex			
Male	54.11	56.76	51.26
Female	45.89	43.24	48.74
Number of Cases	100 (n = 15,329)	100 (n = 32,691)	100 (n = 238)
Missing (Number of Cases)	0	0	0
$\chi^2_{(2)}$		31.85	
p-value		< 0.001	
Race			
Undeclared	4.14	3.53	2.99
White	69.75	63.72	62.82
Black	3.15	5.18	5.13
Pardo (Mixed-race)	19.34	24.39	26.07
Asian	3.49	2.95	2.56
Indigenous	0.13	0.22	0.43
Number of Cases	100 (n = 14,910)	100 (n = 31,847)	100 (n = 234)
Missing (Number of Cases)	419	844	4
$\chi^2_{(6)}$ [a]		271.27	
p-value		< 0.001	
Parental Education			
None with higher education	24.97	39.38	36.05
One with higher education	28.70	29.91	33.05
Both with higher education	46.33	30.71	30.90
Number of Cases	100 (n = 14,818)	100 (n = 31,657)	100 (n = 233)
Missing (Number of Cases)	511	1,034	5
$\chi^2_{(4)}$		1,299.9	
p-value		< 0.001	

Note:

a. In order to calculate the Chi-squared test for the variable for race, the categories for Asian and Indigenous were recoded into one. Both categories had a small number of cases, and were leading to incorrect Chi-squared approximation. Therefore, the Chi-squared test was calculated considering six degrees of freedom.

Appendix C

Description of the World Universities Rankings

Academic Ranking of World University (ARWU)

The ARWU ranking is coordinated by the Graduate School of Education of Shanghai Jio Tong University (SJTU), China, since 2003. Differently from other international university rankings, ARWU ranking does not take into consideration teaching and learning. The main focus of the ARWU ranking is universities' research performance. The SJTU group defends that it is impossible to develop worldwide comparable data in teaching and learning. Moreover, the group does not use any subjective measure of opinion or data provided by the universities themselves (Marginson and van der Wende, 2007). The ARWU uses only objective metrics related to citation, publication and awards. Therefore, the ARWU ranking is considered to be a robust measure of universities' research (Marginson, 2007). Since 2003, the ARWU ranks the top 500 universities worldwide in research performance (ARWU, 2016).

The ARWU uses six indicator to calculate the overall ranking (ARWU, 2016): (1) Number of alumni with Nobel Prizes and Fields Medals, (2) Number of staff with Nobel Prizes and Fields Medals, (3) Number of Highly Cited Research (HiCi) in 21 broad subject areas, (4) Paper published in Nature and Science, (5) Papers indexed in Science Citation Index-expanded and Social Science Citation Index, and (6) Institution's per capita academic performance. Table 25 presents the description and weight of the indicators used in the ARWU ranking.

Table 25: Description and weight of six indicators used to calculate the ARWU ranking.

Indicators	Description	Weight
(1) Number of alumni with Nobel Prizes and Fields Medals	The total number of the alumni of an institution winning Nobel Prizes and Fields Medals. Different weights are set according to the periods of obtaining degrees.	10%
(2) Number of staff with Nobel Prizes and Fields Medals	The total number of the staff of an institution winning Nobel Prizes in Physics, Chemistry, Medicine and Economics and Fields Medal in Mathematics. Different weights are set according to the periods of obtaining degrees.	20%
(3) Number of Highly Cited Research (HiCi)	The number of Highly Cited Researchers selected by Thomson Reuters.	20%
(4) Paper published in Nature and Science	The number of papers published in Nature and Science in the last four years.	20%
(5) Papers indexed in Science Citation Index-expanded and Social Science Citation Index	Total number of papers indexed in Science Citation Index-Expanded and Social Science Citation Index in the previous year.	20%
(6) Institution's per capita academic performance	The weighted scores of the above five indicators divided by the number of full-time equivalent academic staff.	10%

Source: http://www.shanghairanking.com/ARWU-Methodology-2015.html

Accordingly to Marginson (2007), by relying mainly on publications, the ARWU ranking favours universities which are large, strong in the sciences, and from a English speaking country. Moreover, the ranking lean on the Thomson Reuters. The Thomson Reuters is a private company responsible for determining the HiCi and the Science Index-expanded, and the Social Science Citation Index, both used in the calculation of the ARWU ranking.

QS World Universities Ranking

Between 2004 and 2009, the British magazine *Timer Higher Education*[27] and the British company *Quacquarelli Symonds* (QS) have published jointly the THE–QS World University Rankings. With the end of the collaboration, *Quacquarelli*

[27]Formerly known as *Timer Higher Education Supplement.*

Symonds started to annually published their own ranking, continuing with the same methodology of the THE–QS World University Rankings. The first QS World University Ranking was published in 2010.

The QS ranking uses six indicators to evaluate universities in the four following areas: (1) research, (2) teaching, (3) employability, and (4) internationalisation. Table 26 shows the indicators used to assess the four areas and their respective weight.

Compared to the other two ranking analysed, the QS ranking receives the highest number of criticism. The QS methodology is questionable due to greater dependence on peer reviews. 50% of the final score of the ranking is calculated using questionnaires of academic and employers (Dobrota et al., 2016). As highlighted by Huang (2012), the result might only reflect the reputation of the university, instead of the actual performance. The author also discussed the lack of randomisation of the reputation questionnaire. USA, UK, and Australia tend to return the highest number of questionnaire. Therefore, the results tend to favour universities in these countries.

Table 26: Description and weight of six indicators used to assess the four areas evaluated in the QS Ranking.

Indicators	Description	Weight
(1) Academic Reputation	Academics identify institutions where the best work is taking place in their field of study.	40%
(2) Citation per Faculty	Information collected using Scopus. Number of citations relative to the number of academic faculty.	20%
(3) Employer Reputation	Employers identify institutions where the best employees are graduating.	10%
(4) Student-to-Faculty Ratio	Number of academic staff relative to the number of students.	20%
(5) International Faculty Ratio	Proportion of faculty members	5%
(6) International Student Ratio	Proportion of international students	5%

Source: http://www.topuniversities.com/university-rankings articles/world-university-rankings/qs-world-university-rankings-methodology

Times Higher Education World Universities Ranking (THE)

With the end of the partnership with Quacquarelli Symonds, Times Higher Education Magazine publishes their own ranking with collaboration with Thomas Reuters. The THE ranking has a different methodology from the THE-QS World University Rankings and it was first published in 2011. However, in 2012, the methodology of the rank suffered some alteration, but it has remained the same until 2015.

Starting in 2012 [28] [29], the Times Higher Education had used 13 indicators to assess universities in the five following areas: (1) Teaching: The learning environment, (2) Research: Volume, income, reputation , (3) Citations: Research influence, (4) Industry income: Innovation, and (5) International outlook: People, research. Table 27 shows the indicators used to evaluate the five areas and their respective weight.

The Times Higher Education ranking is criticised by weighting highly on citations (30%). Papers which are written is English tend to be more cited when compared to paper published in other languages. Therefore, the THE ranking favours universities which are located in a English speaking country. As the QS ranking, the THE ranking also uses peer review questionnaires. However, the weighting given to the peer review is much lower (33%, compared to 50% for the QS ranking).

[28] Times Higher Education Rank in 2011 is available at:
https://www.timeshighereducation.com/world-university-rankings-2010-11-methodology.

[29] In 2016, the methodology for the Timer Higher Education Rank suffered some small but significant alterations. The changes on the rank will not be describe in this thesis, once the 2016 THE rank is not used in the analysis. For more information about the new methodology: https://www.timeshighereducation.com/news/ranking-methodology-2016.

Table 27: Description and weight of thirteen indicators used to assess the five areas evaluated in the THE Ranking.

Indicators	Description	Weight
(1) Teaching	1. Invitation-only academic reputation survey (15%). 2. Ratio of staff-to-student (4.5%). 3. Ratio of doctoral to bachelor's degrees awarded[1] (2.25%). 4. Number of doctorates awarded by an institution, scaled against its size as measured by the number of academic staff it employs (6%). 5. Institutional income scaled against academic staff numbers, adjusted for purchasing-power parity (2.25%).	30%
(2) Research	1. University's reputation for research excellence among its peers (18%). 2. University research income, scaled against staff numbers and normalised for purchasing-power parity1 (6%). 3. Research productivity - research output scaled against staff numbers and also normalised for subject (6%).	30%
(3) Citations	Number of times a university's published work is cited by scholars globally in the last six years[1].	30%
(4) Industry income	How much research income an institution earns from industry, scaled against the number of academic staff it employs.	2.5%
(5) International outlook	1. Ratio of international to domestic students (2.5%). 2. Ratio of international to domestic staff (2.5%). 3. Proportion of a university's total research journal publications that have at least one international co-author and reward higher volumes[1] (2.5%).	7.5%

Source: https://www.timeshighereducation.com/world-university-rankings-2013-14-methodology
[1] Normalised to reflect variations between different subject areas

Appendix D

OLS Regression for Mathematics Test Scores Against Students' Socioeconomic Characteristics

Table 28 presents the OLS regression estimates and S.E. for mathematics test score on students' socioeconomic characteristics. Around 19 per cent of the variance on Mathematics test score are explained by students socioeconomic characteristics.

Table 28: Estimates and Standard Errors (S.E.) for OLS Regression Model for Mathematics Test Score on Students' Socioeconomic Characteristics.

	Estimate		S.E.
(Intercept)	1.258	***	(0.001)
Year of the ENEM (Ref.: 2009)			
2010	0.049	***	(0.002)
2011	0.216	***	(0.002)
2012	0.162	***	(0.002)
2013	0.204	***	(0.002)
Female	-0.340	***	(0.001)
Race (Ref.: White)			
Undeclared	0.028	***	(0.003)
Black	-0.211	***	(0.002)
Pardo (Mixed-race)	-0.117	***	(0.001)
Asian	0.139	***	(0.003)
Indigenous	-0.164	***	(0.009)
Parental Education (Ref.: Neither Have a H.E. Degree)			
One Has a H.E. Degree	0.148	***	(0.001)
Both Have a H.E. Degree	0.259	***	(0.001)
Family Income (Standardised)	0.139	***	(0.000)
Number of Cases	2,373,539		
Adjusted R-Squared	0.189		

Note: Signif. Codes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Appendix E

Probit Regression Models by Year of the ENEM

Table 29: Estimates and Standard Errors (S.E.) for the Probit Regression Models Predicting the Likelihood of Participating in the SWB Programme on Students' Socioeconomic Characteristics by Year of the ENEM.

	2009			2010			2011		
	Estimate		S.E.	Estimate		S.E.	Estimate		S.E
(Intercept)	-1.853	***	(0.009)	-1.991	***	(0.007)	-2.176	***	(0.010)
Female	-0.133	***	(0.008)	-0.151	***	(0.007)	-0.155	***	(0.009)
Race (Ref.: White)									
Undeclared	-0.012		(0.052)	0.065	***	(0.016)	0.091	***	(0.023)
Black	-0.168	***	(0.018)	-0.094	***	(0.015)	-0.042	*	(0.021)
Pardo (Mixed-race)	-0.065	***	(0.009)	-0.041	***	(0.008)	-0.003		(0.011)
Asian	-0.003		(0.020)	0.007		(0.020)	-0.010		(0.027)
Indigenous	-0.116		(0.073)	-0.117		(0.071)	-0.220		(0.118)
Parental Education (Ref.: Neither Have a H.E. Degree)									
One Has a H.E. Degree	0.209	***	(0.010)	0.201	***	(0.009)	0.158	***	(0.011)
Both Have a H.E. Degree	0.290	***	(0.011)	0.295	***	(0.010)	0.228	***	(0.013)
Family Income (Standardised)	0.085	***	(0.004)	0.071	***	(0.003)	0.059	***	(0.004)
Number of Cases	349,464			556,363			454,125		
AIC	123,428			152,312			84,883		

Note: Signif. Codes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table Continued Next Page.

Table Continued.

	2012			2013		
	Estimate		S.E.	Estimate		S.E.
(Intercept)	-2.757	***	(0.018)	-2.583	***	(0.015)
Female	-0.066	***	(0.016)	-0.206	***	(0.014)
Race (Ref.: White)						
Undeclared	0.122	**	(0.045)	0.380	***	(0.030)
Black	-0.042		(0.037)	0.003		(0.028)
Pardo (Mixed-race)	0.048	*	(0.019)	0.005		(0.016)
Asian	-0.040		(0.053)	-0.014		(0.044)
Indigenous	0.122		(0.153)	-0.031		(0.152)
Parental Education (Ref.: Neither Have a H.E. Degree)						
One Has a H.E. Degree	0.100	***	(0.021)	0.080	***	(0.017)
Both Have a H.E. Degree	0.140	***	(0.024)	0.087	***	(0.020)
Family Income (Standardised)	0.013		(0.008)	0.039	***	(0.007)
Number of Cases	489,763			523,824		
AIC	23,204			34,588		

Note: Signif. Codes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Appendix F

Probit Regression Model Estimating the Likelihood of Participating in the SWB Programme Using the ENADE Dataset

Table 30: Estimates and Standard Errors (S.E.) for the Probit Regression Models Predicting the Likelihood of Participating in the SWB Programme on Students' Socioeconomic Characteristics Using the ENADE dataset.

	Estimate		S.E.
(Intercept)	-2.304	***	(0.011)
Female	-0.200	***	(0.011)
Race (Ref.: White)			
Black	-0.176	***	(0.025)
Pardo (Mixed-race)	-0.053	***	(0.012)
Asian	0.034		(0.035)
Indigenous	-0.154	*	(0.074)
Parental Education (Ref.: Neither Have a H.E. Degree)			
One Has a H.E. Degree	0.250	***	(0.013)
Both Have a H.E. Degree	0.516	***	(0.014)
Family Income (Standardised)	0.155	***	(0.005)
Number of Cases	429,260		
AIC	61,315		

Notes:

a. Signif. Codes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

b. The AIC value for the null model is equal to 66,987.

Appendix G

Random Intercept Models With Variable for Students' Race

	Rankings								
	ARWU			QS			THE		
	Est.		S.E.	Est.		S.E.	Est.		S.E.
Fixed Part									
(Intercept)	-0.529	***	(0.051)	-0.346	***	(0.047)	-0.800	***	(0.049)
Female	-0.051	*	(0.025)	-0.097	***	(0.023)	-0.113	***	(0.024)
Race (Ref.: White)									
Undeclared	-0.050		(0.061)	-0.015		(0.055)	-0.042		(0.058)
Black	0.014		(0.068)	-0.069		(0.063)	-0.035		(0.067)
Pardo (Mixed-race)	-0.076	*	(0.030)	-0.061		(0.028)	-0.079	**	(0.029)
Asian	0.062		(0.060)	0.085		(0.056)	0.015		(0.057)
Indigenous	0.480		(0.297)	0.401		(0.290)	0.641	*	(0.316)
Parental Education (Ref.: Neither Have a H.E. Degree)									
One Has H.E. Degree	0.088	**	(0.033)	0.047		(0.031)	0.081	*	(0.032)
Both Have H.E. Degree	0.188	***	(0.033)	0.108	***	(0.031)	0.152	***	(0.032)
Family Income (Standardised)	0.059	***	(0.010)	0.043	***	(0.010)	0.035	***	(0.010)
Mathematics Test Score (Standardised)	0.082	***	(0.016)	0.138	***	(0.015)	0.103	***	(0.016)
SWB Area of Knowledge (Ref: Engineering)									
Agricultural Sciences	0.065		(0.060)	0.016		(0.058)	0.264	***	(0.063)
Applied Social Sciences	-0.266	***	(0.049)	-0.708		(0.040)	-0.082		(0.048)
Biological Sciences	0.314	***	(0.042)	0.244	***	(0.041)	0.367	***	(0.041)
Exact and Earth Sciences	0.185	***	(0.034)	0.169	***	(0.032)	0.269	***	(0.033)
Health Sciences	0.241	***	(0.039)	0.048	***	(0.037)	0.330	***	(0.039)
Human Sciences	-0.207		(0.297)	-0.040		(0.302)	0.029		(0.301)
Linguistic, Literature and Arts	-0.445	**	(0.149)	-0.560	***	(0.140)	0.037		(0.163)
Technologies	0.695	**	(0.263)	0.451		(0.290)	0.412		(0.277)
Other Areas	0.199	**	(0.064)	0.143	*	(0.062)	0.258	***	(0.061)
Random Part									
σ^2_{y0}	0.026		(0.026)	0.020		(0.026)	0.033		(0.025)
σ^2_{e0}	0.938		(0.030)	1.072		(0.030)	0.961		(0.029)
-2*loglikelihood:	20,809.7			28,302.1			23,318.7		
VPC	2.70%			1.83%			3.32%		
Number of Brazilian H.E. Institutions	71			76			71		
Number of Students	7,429			9,671			8,236		

Note: Signif. Codes: * p < 0.05, ** p < 0.01, *** p < 0.001;

Appendix H

Table 31: Estimates and Residual Variance for Two-level Regression Models Predicting the Mean Standardised ARWU Ranking of the University of Destination During the SWB Programme.

	Model 1			Model 2			Model 3			Model 4		
	Est.		S.E.	Est.		S.E.	Est.		S.E.	Est.		S.E.
Fixed Part												
(Intercept)	-0.065	***	(0.012)	-0.554	***	(0.049)	-0.553	***	(0.063)	-0.907	***	(0.095)
Female				-0.050	*	(0.025)	-0.057	*	(0.024)	-0.010		(0.030)
Parental Education (ref.: Neither Have H.E. Degree)												
One Has H.E. Degree				0.088	**	(0.033)	0.090	**	(0.033)	0.105	*	(0.041)
Both Have H.E. Degree				0.191	***	(0.033)	0.187	***	(0.033)	0.161	***	(0.042)
Family Income (Standardised)				0.061	***	(0.010)	0.061	***	(0.010)	0.027	*	(0.012)
Mathematics Test Score (Standardised)				0.085	***	(0.016)	0.050	**	(0.017)	0.047	*	(0.024)
SWB Area of Knowledge (Ref.: Engineering)												
Agricultural Sciences				0.074		(0.060)	0.032		(0.060)	0.085		(0.079)
Biological Sciences				0.317	***	(0.042)	0.270	***	(0.042)	0.279	***	(0.053)
Health Sciences				0.240	***	(0.039)	0.234	***	(0.039)	0.232	***	(0.050)
Exact and Earth Sciences				0.186	***	(0.034)	0.167	***	(0.034)	0.173	***	(0.041)
Human Sciences				-0.192		(0.297)	-0.198		(0.296)	-0.388		(0.473)
Applied Social Sciences				-0.264	***	(0.049)	-0.268	***	(0.049)	-0.287	***	(0.060)
Linguistic, Literature and Arts				-0.440	**	(0.149)	-0.435	**	(0.149)	-0.484	*	(0.188)
Other Areas				0.200	**	(0.064)	0.192	**	(0.063)	0.245	**	(0.079)
Technologies				0.695	**	(0.263)	0.793	**	(0.264)	0.778		(0.474)
English										0.445	***	(0.054)
Public H.E. Institution							0.095	*	(0.046)	0.078		(0.066)
H.E. Institution's Number of Staff (Standardised)							0.031	***	(0.006)	0.061	***	(0.017)
Region of Brazil Where H.E. Institution Is Located (Ref.: Southeast)												
Central-West							-0.043		(0.050)	-0.006		(0.095)
Northeast							-0.116	***	(0.032)	-0.014		(0.058)
North							-0.286	**	(0.100)	-0.264		(0.144)
South							0.008		(0.032)	0.061		(0.060)
Random Part												
σ^2_{u0}	0.035		(0.027)	0.026		(0.026)	0.014		(0.025)	0.021		(0.007)
σ^2_{e0}	0.977		(0.031)	0.939		(0.030)	0.943		(0.029)	0.879		(0.019)
-2*loglikelihood	21,169.7			20,821.2			20,754.4			12,314.8		
VPC	3.46%			2.69%			1.46%			2.33%		
Number of Brazilian H.E. Institutions	71			71			71			71		
Number of Students	7,429			7,429			7,429			4,523		

Notes:

a. Signif. Codes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$;

b. Likelihood ratio tests indication that the random intercept variance of Model 1, 2, and 3 are significant at the 5% level. Model 4 was compared to the Variance Component model for the same sample of Model 4.

Appendix I

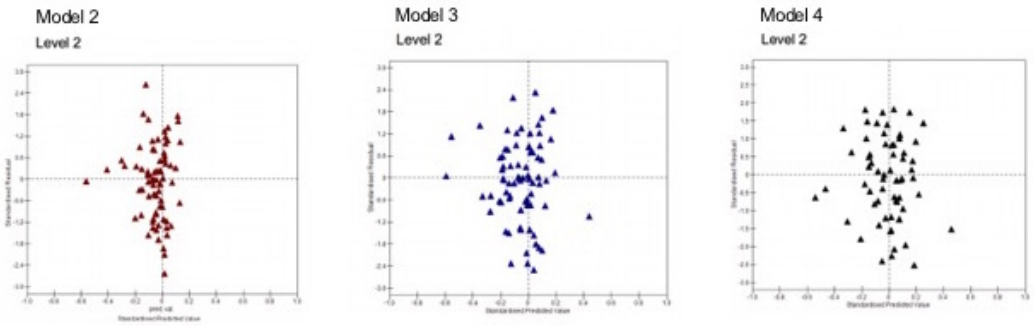

Figure 15: Plot for the residual against fixed part for level 2 for Models 2, 3 and 4 for the QS ranking.

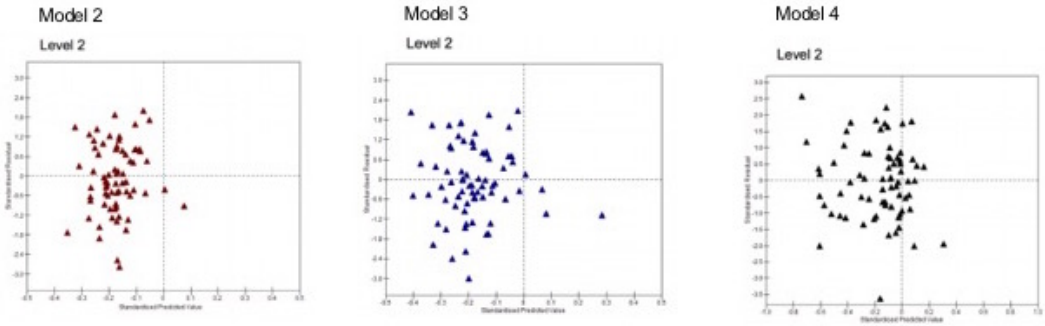

Figure 16: Plot for the residual against fixed part for level 2 for Models 2, 3 and 4 for the ARWU ranking.

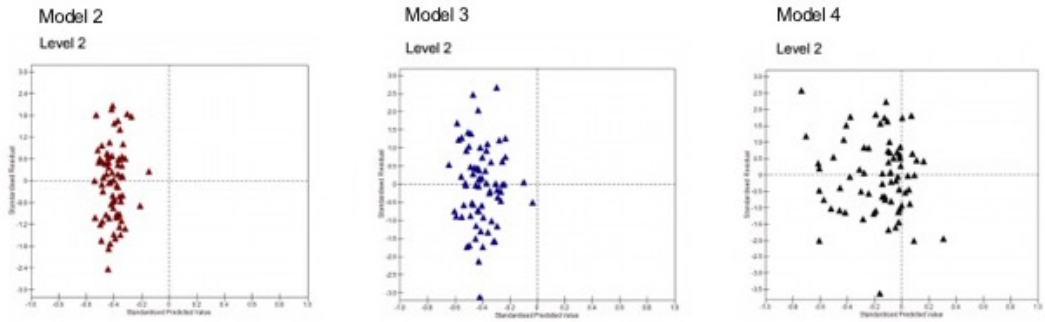

Figure 17: Plot for the residual against fixed part for level 2 for Models 2, 3 and 4 for the THE ranking.

Table 32: Estimates and Residual Variance for Two-level Regression Models Predicting the Mean Standardised THE Ranking of the University of Destination During the SWB Programme.

	Model 1			Model 2			Model 3			Model 4		
	Est.		S.E.	Est.		S.E.	Est.		S.E.	Est.		S.E.
Fixed Part												
(Intercept)	-0.333	***	(0.011)	-0.829	***	(0.048)	-0.772	***	(0.061)	-1.039	***	(0.084)
Female				-0.113	***	(0.024)	-0.114	***	(0.024)	-0.086	**	(0.029)
Parental Education (Ref.: Neither Have a H.E. Degree)												
One Has H.E. Degree				0.083	*	(0.032)	0.083	**	(0.032)	0.075		(0.041)
Both Have H.E. Degree				0.156	***	(0.032)	0.148	***	(0.032)	0.124	**	(0.040)
Family Income (Standardised)				0.037	***	(0.010)	0.034	***	(0.010)	0.016		(0.011)
Mathematics Test Score (Standardised)				0.105	***	(0.016)	0.087	***	(0.017)	0.097	***	(0.023)
SWB Area of Knowledge (Ref.: Engineering)												
Agricultural Sciences				0.273	***	(0.063)	0.245	***	(0.063)	0.255	**	(0.081)
Applied Social Sciences				-0.082		(0.048)	-0.098	*	(0.048)	-0.156	**	(0.058)
Biological Sciences				0.371	***	(0.041)	0.332	***	(0.041)	0.355	***	(0.052)
Exact and Earth Sciences				0.270	***	(0.033)	0.254	***	(0.033)	0.304	***	(0.040)
Health Sciences				0.328	***	(0.039)	0.313	***	(0.039)	0.379	***	(0.050)
Human Sciences				0.042		(0.302)	0.040		(0.300)	0.154		(0.486)
Linguistic, Literature and Arts				0.042		(0.163)	0.045		(0.162)	0.008		(0.204)
Technologies				0.412		(0.277)	0.437		(0.278)	0.675		(0.488)
Other Areas				0.256	***	(0.061)	0.255	***	(0.060)	0.290	***	(0.075)
English										0.333	***	(0.046)
Public H.E. Institution							-0.050		(0.044)	-0.044		(0.052)
H.E. Institution's Number of Staff							0.036		(0.006)	0.027	***	(0.008)
Region of Brazil Where H.E. Institution Is Located (Ref.: Southeast)												
Central-West							0.078		(0.049)	0.081		(0.059)
Northeast							-0.070	*	(0.032)	-0.082	*	(0.037)
Noth							-0.091		(0.103)	-0.092		(0.118)
South							0.115	***	(0.032)	0.076		(0.039)
Random Part												
σ^2_{u0}	0.045		(0.027)	0.036		(0.025)	0.021		0.025	(0.000)		(0.000)
σ^2_{e0}	0.990		(0.030)	0.959		(0.029)	0.966		(0.029)	0.943		(0.019)
-2*loglikelihood	23,651.0			23,330.8			23,266.8			14,352.2		
VPC	4.35%			3.62%			2.13%			0.00%		
Number of Brazilian H.E. Institutions	71			71			71			71		
Number of Students	8,236			8,236			8,236			5,165		

Notes:
a. Signif. Codes: * p < 0.05, ** p < 0.01, *** p < 0.001;
b. Likelihood ratio tests indication that the random intercept variance of Model 1, 2, and 3 are significant at the 5% level. Model 4 was compared to the Variance Component model for the same sample of Model 4.