Access in free-tuition systems: A comparative perspective of the socioeconomic background of students in countries with different tuition policies

Author: Ariane de Gayardon de Fenoyl

Persistent link: http://hdl.handle.net/2345/bc-ir:107316

This work is posted on eScholarship@BC, Boston College University Libraries.

Boston College Electronic Thesis or Dissertation, 2017

Copyright is held by the author. This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (http:// creativecommons.org/licenses/by-nc-nd/4.0).

Boston College Lynch School of Education

Department of Educational Leadership and Higher Education

Program in Higher Education

ACCESS IN FREE-TUITION SYSTEMS: A COMPARATIVE PERSPECTIVE OF THE SOCIO-ECONOMIC BACKGROUND OF STUDENTS IN COUNTRIES WITH DIFFERENT TUITION POLICIES

Dissertation by

ARIANE DE GAYARDON DE FENOYL

submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy

May 2017

© Copyright 2017 Ariane de Gayardon de Fenoyl

ACCESS IN FREE-TUITION SYSTEMS: A COMPARATIVE PERSPECTIVE OF THE SOCIO-ECONOMIC BACKGROUND OF STUDENTS IN COUNTRIES WITH DIFFERENT TUITION POLICIES

Ariane de Gayardon de Fenoyl

Advisor: Dr. Hans de Wit

As higher education enters the 21st century, funding issues have evolved with continued massification and limited government funding (Johnstone & Marcucci, 2010). Increased reliance on students and their families to cover the cost of higher education have led to student demonstrations across the globe, their main demand being free tertiary education to improve equitable access (Bernasconi, 2012; Cloete, 2015; Taylor, 2014).

This international comparative quantitative international study explores the relationship between tuition fees policies, and more specifically tuition-free policies, and equitable access in three Latin American countries. Participation, college choice, and attrition decisions are analyzed through the lens of the financial and cultural capitals of students, using 2011 and 2013 data from socio-economic surveys in Chile – a high tuition fees country, and Brazil and Argentina – two countries with free public higher education.

The findings suggest that tuition fees policies do not carry the importance students think it does. Countries with tuition-free public higher education seem to have similar issues, if not worse, than tuition-charging countries in ensuring equitable access and success for students from low socio-economic backgrounds.

ACKNOWLEDGMENTS

This dissertation could not be complete without the recognition of all those who, during my time in Boston, have helped, supported, and advised me, and made these 4 years a great adventure.

It is only fitting that I start by expressing my gratitude to my committee for their academic support and encouragement. I would like to particularly acknowledge Dr. Hans de Wit for agreeing to chair my committee, being always available (in-between travels) and for providing so many insightful and quick feedbacks. I am grateful to Dr. Ana Martinez-Aleman for pushing me to become a better researcher by encouraging me to always critique my and others' studies. Finally, Dr. Henry Braun has been instrumental to the completion of this dissertation, and I thank him for sharing some of his immense quantitative knowledge with me.

I would not even have started this dissertation if it weren't for Dr. Philip Altbach and Dr. Laura Rumbley who decided 4 years ago to welcome me at the Center for International Higher Education. They have both been incredible support, especially by always being available for discussion and brainstorming, and they provided me with countless advice and opportunities in the past 4 years. I am also thankful to my colleagues at CIHE: Yukiko Shimmi and Dave Stanfield for their friendship, for sharing their experience, and for demystifying the PhD process; Georgiana Mihut, who sat two years next to me, for being an efficient and thoughtful researcher, with whom I had the pleasure of working; as well as Kara Godwin for her inexhaustible enthusiasm.

iv

I am grateful to have been able to share this experience with an amazing cohort made of great scholars, and I am glad to finish it alongside Alana Anderson, Kevin Gin, and Brian Swenson.

Et bien sûr tout ceci n'aurait pas été envisageable si ce n'est pour le soutien de ma famille et mes amis, même de loin. Sans eux, je ne serai pas en train d'écrire ces lignes, et j'espère qu'ils en sont conscients.

I am additionally grateful to the various administrative entities that provide public access to their socio-economic surveys: the Ministerio de Desarollo Social in Chile for the CASEN data, the Instituto Brasileiro de Geografía e Estatistica in Brazil for the PNAD data, and the Instituto Nacional de Estadistica y Censos in Argentina for the EPH data.

TABLE OF CONTENTS

AC	CKNOWLEDGMENTS	iv
ТА	ABLE OF CONTENTS	vi
LI	ST OF TABLES	xii
LI	IST OF FIGURES	xiv
1.	INTRODUCTION	1
]	Research Problem and Purpose	3
]	Key Terms and Scope	5
]	Research Questions	6
]	Research Significance	7
	Theoretical Framework	8
l	Methodology	11
]	Positionality	12
(Chapter Outline	12
(Conclusion	13
2.	FINANCING HIGHER EDUCATION	14
	The Rising Cost of Higher Education	14
	The Cost Disease	15
	Technology	17
	Competition	
ľ	Massification and its Impact on Costs	20
	Theory and Reality	
	Reasons for Higher Demand	
	Massification and Cost	

Higher Education as a Public Good	
Economic Benefits	
Social Benefits	
Financial Austerity and Fragility	
Scarce Public Resources	
Austerity	
Fragility	
Higher Education as a Private Good	
Economic Benefits	
Social Benefits	
Rate of Return on Higher Education	
The Concept of Cost-Sharing	
The Different Forms of Cost-Sharing	
Rationales for Cost-Sharing	
The Importance of Context	
3. TUITION-FREE HIGHER EDUCATION	
Landscape and History	
Rationales Behind Tuition-Free Higher Education	
Higher Education as a Right	
The Information Imbalance	
The Need for "Equal Opportunity"	
The Various Forms of Free Tuition Higher Education	
Nominal Fees	
Dual Track	
Privatisation	

Full Free Tuition	61
Typology	62
A Definition of Free	63
Conclusion	64
4. THE RELATIONSHIP BETWEEN TUITION FEES AND ACCESS	66
Defining Access	66
How Students Make Choices?	69
Tuition Fees and Participation in Higher Education	72
Tuition Fees and College Choice	75
Tuition Fees and Attrition	77
5. COUNTRIES OF STUDY	82
The Choice of Countries	82
A Small-N Comparative Study	82
The Choice of Countries and Timeframe	84
A Historical View of the Three Systems	85
Description of the Current Chilean System	87
An Overview	88
Transition to Higher Education	89
Higher Education Funding	90
Description of the Current Brazilian System	
An Overview	
Transition to Higher Education	
Higher Education Funding	
Description of the Current Argentinian System	
An Overview	

Tr	ansition to Higher Education	
Hi	gher Education Funding	
Conc	clusion	
6. R	ESEARCH DESIGN	101
Data	Description	
Da	ata Sources	
Sa	mples	
Varia	ables	
Οι	utcome variables	
Pre	edictor variables	
Stu	udent control variables	
Su	immary	
Mi	issing data	
Anal	ytical Strategy	
Hi	gher Education Participation	
Co	ollege Choice	
At	trition	
Ch	necking the Models and Goodness of Fit	
Conc	clusion	
7. RI	ESULTS OF THE PARTICIPATION MODEL	130
Indiv	vidual Models	
Ch	nile	
Ar	gentina	
Br	azil	
Com	bined Model	

(Conclusion	154
8.	RESULTS OF THE COLLEGE CHOICE MODEL	156
]	Individual Models	156
	Chile	
	Argentina	
	Brazil	
(Combined Model	175
(Conclusion	179
9.	RESULTS OF THE ATTRITION MODEL	
]	Individual Models	
	Chile	
	Argentina	
	Brazil	195
(Combined Model	203
(Conclusion	208
10.	. ACCESS, COLLEGE CHOICE, AND ATTRITION THROU	GH THE
LE	ENS OF TUITION FEES POLICIES.	
]	Interpretation of Findings	
	Participation	
	College Choice	
	Attrition	
	A Note on Gender	
	Summary of Findings' Interpretation	
]	Limitations	220
]	Factors Influencing the Results	

Participation	
College choice	
Attrition	
Comparative Higher Education and Big Data	
Policy Implications	
Final Thoughts and Future Research	236
REFERENCES	
APPENDIX	

LIST OF TABLES

TABLE 2.1. THE MASSIFICATION OF HIGHER EDUCATION WORLDWIDE	22
TABLE 5.1. INSTITUTIONS AND ENROLLMENT IN CHILE.	89
TABLE 5.2. INSTITUTIONS AND ENROLLMENT IN BRAZIL	93
TABLE 5.3. INSTITUTIONS AND ENROLLMENT IN ARGENTINA	97
TABLE 5.4. SUMMARY OF KEY STATISTICS FOR THE THREE SYSTEMS.	100
TABLE 6.1. CHANGES IN SAMPLES' SIZES WITH SAMPLING DECISIONS FOR THE	
PARTICIPATION SAMPLE	104
TABLE 6.2. CHANGES IN SAMPLES' SIZES WITH SAMPLING DECISIONS FOR THE COLLEG	Е
CHOICE SAMPLE	105
TABLE 6.3. CHANGES IN SAMPLES' SIZES WITH SAMPLING DECISIONS FOR THE ATTRITI	ON
SAMPLE	105
TABLE 6.4. DESCRIPTIVE STATISTICS FOR PARTICIPATION	106
TABLE 6.5. DESCRIPTIVE STATISTICS FOR COLLEGE CHOICE	107
TABLE 6.6. DESCRIPTIVE STATISTICS FOR ATTRITION, BY COUNTRY	108
TABLE 6.7. DESCRIPTIVE STATISTICS FOR THE ACADEMIC YEARS, BY STUDENT STATUS	S AND
BY COUNTRY	109
TABLE 6.8. INCOME DISTRIBUTION PER QUINTILE OF WEALTH	112
TABLE 6.9. DESCRIPTIVE STATISTICS FOR INCOME QUINTILES, BY COUNTRY.	112
TABLE 6.10. PERCENTAGE OF MISSING VALUES FOR PARENTAL EDUCATION, BY COUNT	RY.
	113
TABLE 6.11. DESCRIPTIVE STATISTICS FOR PARENTAL EDUCATION, BY COUNTRY	114
TABLE 6.12. DESCRIPTIVE STATISTICS FOR GENDER, BY COUNTRY.	115

TABLE 6.13. DESCRIPTIVE STATISTICS FOR BIRTH COHORT, BY COUNTRY	5
TABLE 6.14. DESCRIPTION OF VARIABLES. 11	17
TABLE 6.15. DESCRIPTION OF THE FULL PARTICIPATION MODEL 12	20
TABLE 6.16. DESCRIPTION OF THE FULL COLLEGE CHOICE MODEL 12	22
TABLE 6.17. DESCRIPTION OF THE FULL ATTRITION MODEL 12	27
TABLE 7.1. ODDS RATIO OF PARTICIPATION FOR THE CHILEAN INDIVIDUAL MODEL	32
TABLE 7.2. Odds ratio of participation for the Argentinian individual model 13	39
TABLE 7.3. ODDS RATIO OF PARTICIPATION FOR THE BRAZILIAN INDIVIDUAL MODEL 14	16
TABLE 8.1. ODDS RATIO OF CHOOSING THE PRIVATE SECTOR FOR THE CHILEAN INDIVIDUA	L
MODEL	58
TABLE 8.2. ODDS RATIO OF CHOOSING THE PRIVATE SECTOR FOR THE ARGENTINIAN	
INDIVIDUAL MODEL	54
TABLE 8.3. ODDS RATIO OF CHOOSING THE PRIVATE SECTOR FOR THE BRAZILIAN	
INDIVIDUAL MODEL	71
TABLE 9.1. ODDS RATIO OF ATTRITION FOR THE CHILEAN INDIVIDUAL MODEL 18	34
TABLE 9.2. Odds ratio of attrition for the Argentinian individual model 19)1
TABLE 9.3. ODDS RATIO OF ATTRITION FOR THE BRAZILIAN INDIVIDUAL MODEL)8
TABLE 10.1. COMPARISON OF KEY STATISTICS BETWEEN THE LITERATURE AND THE	
SURVEYS, BY COUNTRY	24

LIST OF FIGURES

FIGURE 7.7. PROBABILITY OF PARTICIPATION IN HIGHER EDUCATION IN ARGENTINA FOR A	
MALE BORN IN 1991 from the third quintile of household income, by	
PARENTAL EDUCATION	.3
FIGURE 7.8. PROBABILITY OF PARTICIPATION IN HIGHER EDUCATION IN ARGENTINA FOR A	
male born in 1991 from the third quintile of household income, by	
PARENTAL EDUCATION AND OVER REGIONS	4
FIGURE 7.9. PROBABILITY OF PARTICIPATION IN HIGHER EDUCATION IN BRAZIL FOR A	
male born in 1991 whose most educated parent graduated high school, by	
HOUSEHOLD INCOME	.7
FIGURE 7.10. PROBABILITY OF PARTICIPATION IN HIGHER EDUCATION IN BRAZIL FOR A	
male born in 1991 whose most educated parent graduated high school, by	
HOUSEHOLD INCOME OVER REGIONS	.9
FIGURE 7.11. PROBABILITY OF PARTICIPATION IN HIGHER EDUCATION IN BRAZIL FOR A	
MALE BORN IN 1991 from the third quintile of household income, by	
PARENTAL EDUCATION	0
FIGURE 7.12. PROBABILITY OF PARTICIPATION IN HIGHER EDUCATION IN BRAZIL FOR A	
male born in 1991 from the third quintile of household income, by	
PARENTAL EDUCATION AND OVER REGIONS	1
FIGURE 7.13. PROBABILITY OF PARTICIPATION IN HIGHER EDUCATION IN ALL THREE	
COUNTRIES FOR A MALE BORN IN 1991 whose most educated parent graduated	
HIGH SCHOOL, BY HOUSEHOLD INCOME	2

FIGURE 7.14. PROBABILITY OF PARTICIPATION IN HIGHER EDUCATION IN ALL THREE	
COUNTRIES FOR A MALE BORN IN 1991 from the third quintile of household	
INCOME, BY PARENTAL EDUCATION	154
FIGURE 8.1. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN CHILE FOR A MALE	
BORN IN 1991 WHOSE MOST EDUCATED PARENT GRADUATED HIGH SCHOOL, BY	
HOUSEHOLD INCOME	159
FIGURE 8.2. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN CHILE FOR A MALE	
BORN IN 1991 WHOSE MOST EDUCATED PARENT GRADUATED HIGH SCHOOL, BY	
HOUSEHOLD INCOME OVER REGIONS	160
FIGURE 8.3. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN CHILE FOR A MALE	
BORN IN 1991 FROM THE THIRD QUINTILE OF HOUSEHOLD INCOME, BY PARENTAL	
EDUCATION	161
FIGURE 8.4. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN CHILE FOR A MALE	
BORN IN 1991 FROM THE THIRD QUINTILE OF HOUSEHOLD INCOME, BY PARENTAL	
EDUCATION OVER REGIONS	162
FIGURE 8.5. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN ARGENTINA FOR A	
MALE BORN IN 1991 WHOSE MOST EDUCATED PARENT GRADUATED HIGH SCHOOL, E	3Y
HOUSEHOLD INCOME	165
FIGURE 8.6. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN ARGENTINA FOR A	
MALE BORN IN 1991 WHOSE MOST EDUCATED PARENT GRADUATED HIGH SCHOOL, E	3Y
HOUSEHOLD INCOME OVER REGIONS	166

FIGURE 8.7. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN ARGENTINA FOR A
MALE BORN IN 1991 from the third quintile of household income, by
PARENTAL EDUCATION
FIGURE 8.8. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN ARGENTINA FOR A
MALE BORN IN 1991 from the third quintile of household income, by
PARENTAL EDUCATION AND OVER REGIONS
FIGURE 8.9. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN BRAZIL FOR A MALE
BORN IN 1991 WHOSE MOST EDUCATED PARENT GRADUATED HIGH SCHOOL, BY
HOUSEHOLD INCOME
FIGURE 8.10. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN BRAZIL FOR A MALE
BORN IN 1991 WHOSE MOST EDUCATED PARENT GRADUATED HIGH SCHOOL, BY
HOUSEHOLD INCOME
FIGURE 8.11. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN BRAZIL FOR A MALE
BORN IN 1991 FROM THE THIRD QUINTILE OF HOUSEHOLD INCOME, BY PARENTAL
EDUCATION
FIGURE 8.12. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN BRAZIL FOR A MALE
BORN IN 1991 FROM THE THIRD QUINTILE OF HOUSEHOLD INCOME, BY PARENTAL
EDUCATION AND OVER REGIONS
FIGURE 8.13. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN ALL THREE COUNTRIES
FOR A MALE BORN IN 1991 whose most educated parent graduated high
SCHOOL, BY HOUSEHOLD INCOME

FIGURE 8.14. PROBABILITY OF CHOOSING A PRIVATE INSTITUTION IN ALL THREE COUNTRIES
FOR A MALE BORN IN 1991 from the third quintile of household income, by
PARENTAL EDUCATION
FIGURE 9.1. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN CHILE FOR A MALE
BORN IN 1991 WHOSE MOST EDUCATED PARENT GRADUATED HIGH SCHOOL, BY
HOUSEHOLD INCOME
FIGURE 9.2. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN CHILE FOR A MALE
BORN IN 1991 WHOSE MOST EDUCATED PARENT GRADUATED HIGH SCHOOL, BY
HOUSEHOLD INCOME OVER REGIONS
FIGURE 9.3. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN CHILE FOR A MALE
BORN IN 1991 FROM THE THIRD QUINTILE OF HOUSEHOLD INCOME, BY PARENTAL
EDUCATION
FIGURE 9.4. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN CHILE FOR A MALE
BORN IN 1991 FROM THE THIRD QUINTILE OF HOUSEHOLD INCOME, BY PARENTAL
EDUCATION AND OVER REGIONS
FIGURE 9.5. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN ARGENTINA FOR A
male born in 1991 whose most educated parent graduated high school, by
HOUSEHOLD INCOME
FIGURE 9.6. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN ARGENTINA FOR A
male born in 1991 whose most educated parent graduated high school, by
HOUSEHOLD INCOME OVER REGIONS

FIGURE 9.7. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN ARGENTINA FOR A
MALE BORN IN 1991 from the third quintile of household income, by
PARENTAL EDUCATION
FIGURE 9.8. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN ARGENTINA FOR A
MALE BORN IN 1991 from the third quintile of household income, by
PARENTAL EDUCATION AND OVER REGIONS
FIGURE 9.9. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN BRAZIL FOR A MALE
BORN IN 1991 WHOSE MOST EDUCATED PARENT GRADUATED HIGH SCHOOL, BY
HOUSEHOLD INCOME
FIGURE 9.10. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN BRAZIL FOR A MALE
BORN IN 1991 WHOSE MOST EDUCATED PARENT GRADUATED HIGH SCHOOL, BY
HOUSEHOLD INCOME OVER REGIONS
FIGURE 9.11. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN BRAZIL FOR A MALE
BORN IN 1991 FROM THE THIRD QUINTILE OF HOUSEHOLD INCOME, BY PARENTAL
EDUCATION
FIGURE 9.12. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN BRAZIL FOR A MALE
BORN IN 1991 FROM THE THIRD QUINTILE OF HOUSEHOLD INCOME, BY PARENTAL
EDUCATION AND OVER REGIONS
FIGURE 9.13. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN ALL THREE
COUNTRIES FOR A MALE BORN IN 1991 WHOSE MOST EDUCATED PARENT GRADUATED
HIGH SCHOOL, BY HOUSEHOLD INCOME QUINTILE AND COUNTRY

FIGURE 9.14. PROBABILITY OF ATTRITION FROM HIGHER EDUCATION IN ALL THREE

1. INTRODUCTION

In the 21st century, higher education systems across the globe have been more systematically faced with financial difficulties (Johnstone, 2002; Johnstone & Marcucci, 2010). As governments are challenged to fund increasingly expansive higher education systems that attract ever more students, new revenue streams are sought out to ensure an open system of quality. Consequently, systems rely more and more on cost-sharing, i.e. rely increasingly on students and their families to pay for part or all of the higher education cost (Johnstone, 2003). Different systems have dealt with cost-sharing in different ways. For example, where higher education was free, tuition was introduced and where tuition already existed, it was increased. Additionally, reductions in financial aid and increased reliance on the private sector characterize the new state of affairs in many higher education systems (Johnstone, 2004a).

Unsurprisingly, students around the world have taken to the streets to demonstrate against this trend. Student movements have been especially concerned with tuition fees and are often asking for the return to or the establishment of free higher education. Examples abound from every continent, where student movements and public opinion prompt world leaders to put the cost of higher education at the top of their agenda. In 2011, Chilean students demonstrated against the state of the educational system in their country. At the heart of their demands was the claim for free education – primary, secondary, and tertiary (Bernasconi, 2012). The promise of free higher education in Chile became a major stake in the presidential election, and their current president is now trying to set up a solution to honor her electoral promise (Else, 2015). More recently, in

November 2014, thousands of English students demonstrated against tuition fees, also asking for free higher education (Taylor, 2014). Former President of the United States, Barack Obama, advocated for the institution of free community colleges (A. A. Smith, 2015), while many candidates to the 2016 presidential race promised debt-free or free higher education (Ballotpedia, 2015). In November 2015, South African students demanded free tuition through demonstrations and university shut down (Cloete, 2015; Dell, 2015). At a time when many countries are struggling with rising tuition fees, unacceptable levels of student debts, and recurrent cuts on university budgets, free higher education is increasingly attractive.

When students take to the streets to demand free-tuition higher education, they correlate the economic issues with access, claiming that tuition fees erect barriers preventing access for students from lower socio-economic backgrounds. Their logic is simple: no tuition fees means that anyone can have access independently of personal and familial wealth. But the tuition/no tuition debate is much more complicated than that, and the absence of tuition fees rarely means real access for all to public higher education.

The relationship between access and tuition is certainly intricate. It is dependent on the social, political, and economic climates in the system of interest, as well as on the mechanisms existing to offset costs for those unable to pay. While the cost of higher education is undeniably an important element in providing opportunities to students from lower economic strata, it is essential to recognize that a free-tuition policy is hardly the only strategy and probably not the best one. First, the absence of tuition is not a targeted policy for students from low-SES backgrounds: it blindly benefits all types of students. Indeed, there is evidence in some countries that free tuition limits access to the very students that were supposed to benefit from it (Cloete, 2015). Eliminating tuition fees does not only fail to guarantee equity but it also deprives the higher education system from a logical source of revenue: tuition fees from the students who can actually pay. Second, free tuition systems are also facing difficulties in terms of access (McCowan, 2007; Post, 2011), supporting the hypothesis that getting low-SES students to participate in higher education is not predominantly a financial issue.

Eliminating tuition fees is no means to guarantee access, and only by the elicitation of the relationship between these two concepts could policies targeting access be made more relevant by actually focusing on the many factors that determine whether a student will or not attend college – tuition being included but not the sole center of attention.

Research Problem and Purpose

As many politicians across the world are battling the issues of tuition and access, under the pressure of student discontent and media hype over tuition rise and studentdebt, a need exists to look carefully at these two concepts, how they interact, and what impact one can have over the other. While some countries try to eliminate tuition, others are battling with access or quality issues in free public systems. Brazil's free public system for instance is plagued with issues concerning the access and retention of low-SES and minority students (McCowan, 2007). Argentina at the same time has opened the door of its free public universities to everyone, spurring issues of quality of education in an overcrowded environment (Rabossi, 2013). Simultaneously, the sustainability of free-tuition systems is rightly put into question at a time of global austerity. The best example remains the Nordic countries, which are the embodiment of the welfare states and as such have been known to provide free education for all students at all levels. But recently, they have been shying away from these generous policies by establishing tuition fees for Master's degrees and/or for international students (Vabø & Wiers-Jenssen, 2015). If even these social democratic cultures need to find loopholes to generate revenue for their higher education systems, then the reality of establishing or maintaining a free system in today's world must be questioned.

In an effort to make sense of these contradictory trends, this dissertation attempts to explore the extent and strength of the relationship between access and tuition fees in multiple contexts. More specifically, using comparative analysis of tuition-free and tuition-dependent systems, it explores the relationship between tuition fee policies and the access of students from low-SES backgrounds to higher education. Though literature does exist that reports on tuition and access – especially on the rise of tuition and its consequences on access, the current body of research lacks comparative analyses which can give insight on the importance of context and the generalization of trends. Additionally, the focus of literature on access has also been very much targeted at countries introducing tuition fees, while tuition-free countries have been less studied. The literature also lacks comparative studies of access across countries with different tuition policies. In an effort to understand the link between tuition fees and access more thoroughly, this research takes a comparative perspective to study access trends across countries and through time.

Key Terms and Scope

In this study, the term "tuition fees" is used to refer to "a mandatory charge levied upon all students (paid by themselves or their families) covering some portion of the general underlying costs of instruction" (Marcucci & Johnstone, 2007, p. 26). Tuition fees therefore encompass some or all of the costs incurred by institutions in their mission to teach and educate students. Tuition fees are to be distinguished from nominal fees, which are charges billed to students for registration, printing, activities etc. (Johnstone & Marcucci, 2010), and from charges related to the cost of living – housing, food, transportation etc. (Johnstone, 1992). This dissertation will follow Johnstone's example in using "tuition fees" and not the American word "tuition" to avoid confusion for readers from non-American countries where tuition simply refers to instruction.

Consequently, countries with free-tuition higher education systems are characterized by the absence of charges for instruction in the public sector. This means that the higher education cost is borne by the government and uses taxpayers' money to pay for it. In these countries, students and families do not have to contribute to the individual cost of higher education. Put another way, higher education has a "zero price" (Psacharopoulos & Papakonstantinou, 2005) for students in free-tuition public higher education systems. Free tuition higher education can also be achieved through the use of financial aid that covers for the price of tuition, and though the importance of financial aid in the current higher education landscape is incontestable, it is beyond the scope of this dissertation.

Similarly, this dissertation deals with tuition policies toward domestic students. In some regions across the globe, differentiated tuitions are charged for domestic and

international students. Although this is an interesting trend and an important one, it is not the focus of this dissertation either.

In the general education literature, access usually "refers to the ways in which educational institutions and policies ensure—or at least strive to ensure—that students have equal and equitable opportunities to take full advantage of their education" (Great Schools Partnership, 2014). The simple term "access", which originally means that a student has the opportunity to participate, has in this context taken a much deeper meaning, with references to equity and equality and implicating reforms (Forest & Kinser, 2002). Current debates about access to higher education are indeed mostly targeted at pointing out discrimination and inequalities (whether on gender, race, religion etc.) to design reforms or programs to rebalance the system. This dissertation uses "access" to refer to participation, college choice, and completion in higher education of students from all socio-economic backgrounds. It therefore recognizes that access is more than making an opportunity available to a student; it is also ensuring that the conditions are such that the student takes the granted opportunity and succeeds.

The difference between the public and private sectors is obviously of relevance to this dissertation. Referring to a country as being tuition-free means it does not charge tuition for access to its public sector. As such, in the remainder of this dissertation, allusions to "free higher education systems" or "free tuition policies" refer to the public sector unless otherwise stated.

Research Questions

What is the relationship between free higher education and access?

Sub-questions:

- 1. What is the relationship between tuition fees policies and the participation in higher education of students from different socio-economic backgrounds?
- 2. What is the relationship between tuition fees policies and the college choice of students from different socio-economic backgrounds?
- 3. What is the relationship between tuition fees policies and the attrition of enrolled students from different socio-economic backgrounds?

Research Significance

This dissertation covers key topics that have the potential to help policy makers around the world. By shedding a new light on the issue of access, this work could help see what actual tuition policies bring to access and what they fail to change. The ultimate goal is to help better understand the relationship between tuition fees policies and access, especially in the case where country have free-tuition higher education.

Whether free tuition is a good policy or not when it comes to improving access remains to be proven, and this dissertation hopes to add to the debate. Free tuition policies have been under attack for this very flaw in the news in light of recent events. In fact, in the discussion about recent movements in Chile, the United States, and South Africa, the major critic has been that free tuition does not improve equality and/or equity in higher education system (Bruenig, 2014; Cloete, 2015). Studies about individual countries with free tuition policies have indeed shown that they are encountering similar if not worse issues in terms of equity in access. Explanations include a restriction of the number of seats in the free public system, the lack of adequate support for students, or even inequalities in the K-12 system (Chien, Montjouridès, & van der Pol, 2017; Grubb, Marit Jahr, Neumuller, & Field, 2005; McCowan, 2007).

This study is of significance because it proposes a cross-country analysis, thus comparing data across free and tuition fees charging public systems. It goes further than country case studies and tries to show how free tuition policies relate to access at a national level. If tuition-free systems are found to not have better access and retention than fee-dependent ones, tuition should become a secondary argument in the race to improve access for all. The question of improving access to universities for low-SES students will need to revolve around other corrective mechanisms and support systems that are not necessarily financial.

Theoretical Framework

Access is a complicated concept in the domain of higher education that covers an intricate realm of decisions made by students (Paulsen & St. John, 2002). This dissertation uses the student choice construct as its main framework, thus looking at three important decisions made by students: the decision to participate in higher education, their college choice decision, and the decision to persist to graduation. Most of the literature below is from the United States, where high proportion of the literature on access to higher education has been developed. Although access to higher education is dependent on context and culture, this literature provides a strong framework for the study and analysis of access internationally.

The decision to participate in higher education starts with the intent to participate to higher education. Participation is dependent on race, gender, wealth, ethnicity,

religion, parent education, and disability among others (Chien et al., 2017). This intention has also been shown to be extremely reliant on the student support structure that encourages them to explore post-secondary opportunities, especially their families and friends (Moogan, Baron, & Harris, 1999; Savitz-Romer & Bouffard, 2012). Another important factor is the high school environment: it matters not only whether students have access to high-level courses, but also what is expected of them, and the involvement of teachers and counseling services (King, 1996; Moogan et al., 1999). All these factors lead to a student being aware of the available possibilities for them to attend postsecondary education and to them being conscious and active in the search for information about opportunities.

The second step in the student choice construct process is the college choice. With the massification of higher education, systems have expanded and diversified giving students more options than ever. Beyond the choice to attend higher education, students must choose between vocational institutions, technical institutions, liberal art colleges, and research universities among others. An additional choice that comes into consideration is the sector: public or private. Hossler and Gallagher (1987) stated that to achieve such a choice, students go through three phases: predisposition, search, and actual choice. These three steps end with a student applying to some institutions, but the actual institution they attend is also dependent on attributes of the system, in particular its selectivity. Factors of importance to the college choice, from the student perspective, include access to information, cost and financial aid, high school counselors, parental opinion, and the student's social class among others (Cabrera & La Nasa, 2000; Paulsen & St. John, 2002). Perna (2006), in particular, summarized the complexity of this choice for students by designing a framework of college choice that insists on the importance of contexts. College choice is therefore sensitive to both internal and external influences, that weigh more or less on the choice of institutions.

The third choice that is pertinent to student access to higher education is the decision to persist to graduation. This means that students attend college consistently until finishing their coursework and receiving their diploma. Astin (1991) stated that student persistence is the consequence of input factors – the student background, environmental factors – the institutional and campus environment, and finally outcomes – the student characteristics as a result of its interaction with the environment. Tinto (1975) insisted particularly on the institution's responsibility in retaining students through appropriate integration, but also recognized the importance of student personal characteristics. These two foundational texts have been instrumental to the further analysis of persistence, although they have been revised over the years to include students' characteristics such as gender, race, and sociodemographic factors, and to take into account the organizational context (Pascarella & Terenzini, 1991; Reason, 2009).

These three student choices have therefore been shown to depend on student's background, environment, and on institutional characteristics. This dissertation takes a step back and looks at the impact of national policy for a key financial institutional characteristic – tuition fees which relates to the cost of higher education. It will look at the way policy-making can influence personal student decisions.

This dissertation also follow on from the heritage of behavioral economics, recognizing that students are making decisions under uncertainty and that errors in decision-making can be explained by background and psychological information (Diamond, Vorley, Roberts, & Jones, 2012). In this regard, this dissertation also borrows from the information-processing framework (Cardak, Bowden, & Bahtsevanoglou, 2015; Simões & Soares, 2010; Vrontis, Thrassou, & Melanthiou, 2007), that mixes economic and sociologic approaches to student decisions. Both these approaches recognize the complexity of student decisions and the myriad of factors that weigh on their final choice.

Methodology

Using a longitudinal comparative analysis of tuition-free and tuition-dependent systems, this dissertation aims to explore the relationship between the presence or absence of tuition fees and the access of students from low-SES backgrounds to higher education in Chile, Brazil, and Argentina. By lessening the impact of context (historical and geographical – as detailed further on), it hopes to come close to the true relationship between tuition fees and access and therefore enlighten policy making to improve access the world over.

The data used comes from socio-economic surveys that include data from randomly selected households in the three countries of interest. The three chosen countries are meant to be representative and information-rich cases of specific tuition policies in a similar context. Latin America has been chosen as the region of focus for this study, as it is one of the region where free-tuition public systems are still dominant, and because its higher education systems remain understudied and seldom analyzed comparatively. Chile has been chosen as the base country for comparison being a country with high fees. Brazil and Argentina are both free public systems, but while Brazil is elitist – its public institutions select students on merit – and has a strong private system concentrating the majority of enrollment, Argentina has a strong public system ruled by open access to all.

Using three countries is necessary methodologically to ensure better generalization of results beyond the contextual realities of the chosen countries. Similarly, using more than one point in time allows for the generalization of similar results independent of the historical context.

Positionality

As a researcher, I acknowledge that I have never paid tuition fees when attending higher education. I come from a country that has very low tuition fees and a significant aid system that numerous students benefit from. I am however not an advocate of freetuition in higher education: if anything, I believe it is a problematic and non-sustainable policy.

Additionally, I am not a native of any of the countries that I am analyzing, nor am I completely fluent in the languages they use.

Chapter Outline

The subsequent chapter uses the literature to answer the question of the rising cost of education. To fully understand the current debate around tuition and access, it is indeed necessary to start with the increasing cost born by higher education institutions in their mission to educate students, be at the forefront of scientific research, and provide services to communities. The following chapter is dedicated to tuition-free systems and their prevalence in the world despite continuing austerity trends. The truth about what it means to be a "free public higher education system" today is uncovered and a definition of what "free" really stands for in this work is provided. A third chapter looks at the literature, mostly comprised of national-level research, of the relationship between tuition fees and access.

This section looking at existing research is followed by a chapter explaining the choice process for the countries used in this dissertation and a chapter describing the quantitative research models used to answer the research questions. Chapters 7 to 9 follow and detail the results of the study for participation, college choice, and attrition respectively. Finally, chapter 10 concludes this study with a summary of findings, insights for policy-making, and paths for future research.

Conclusion

This dissertation builds through careful analysis of appropriate data a case against free-tuition policies as a mean to generate access for all to higher education. The hope is that policy-makers and students will cease to look at free tuition as a magical solution to unequitable access. Not only does this study advocates targeted financial interventions toward disadvantaged population, but it also encourages the reader to think about barriers to access beyond mere financial ones. These are the ones that should become the heart of policy-making for equitable access.

2. FINANCING HIGHER EDUCATION

The conversation about tuition fees policies has to be mindful of the international higher education context, and more specifically current issues and trends pertaining to higher education funding. This chapter therefore introduces the realities of higher education financing nowadays from a global perspective, current policy trends, and the schools of thoughts that support them.

As this study endeavors to take a global look at higher education financing, it is important to note that few scholars have done significant and sustained work on higher education funding with a truly global perspective. This study therefore relies heavily on the work done by Bruce Johnstone through the International Comparative Higher Education and Finance Project, and is limited by the slow-down of the project in 2007 when Bruce Johnstone became emeritus. Although several books have been published on the subject with an international perspective, and many articles keep being written at a national level, no project has yet succeeded in providing such in depth comparative analysis and as many national analysis as the project led by Bruce Johnstone. Therefore, this chapter relies heavily on literature by Bruce Johnstone, although more recent sources are used whenever relevant and available.

The Rising Cost of Higher Education

The conversation about free higher education, its potential and sustainability, needs to start with a discussion of the actual cost of tertiary education. In the last decades, higher education costs have increased exponentially (Archibald & Feldman, 2011;

Bowen, 2012; Frank & Cook, 1995; Johnstone, 2002, 2008; Johnstone & Marcucci, 2010; R. E. Martin, 2011). The cost of higher education, for the sake of this discussion, can be defined as "expenses reflected in colleges and university budgets that support the institution instructional mission" (Johnstone & Marcucci, 2010, p. 14). Its main and most expensive components are the wages and benefits (such as pension and health insurance) of faculty and staff. Student services and more indirect costs such as building maintenance, library functioning, and administration are also significant (Johnstone & Marcucci, 2010). Capital depreciation contributes as well to some extent to the cost of higher education (Johnstone & Marcucci, 2010). All of these costs that directly and indirectly support institutional instructional mission have swelled dramatically in the past decades.

This phenomenon is having a dramatic impact on tertiary education globally. The rationales behind the excessive rise in the cost of higher education have been extensively discussed in the literature and can be summarised around three main ideas: the cost disease, technology, and competition.

The Cost Disease

The theory of the cost disease was first introduced to explain the rising cost of the arts (Baumol & Bowen, 1966). In an attempt to apply the concept to tertiary education, Bowen (2011) summarised:

In labour-intensive industries such as the performing arts and education, there is less opportunity than in other sectors to increase productivity by, for example, substituting capital for labour. Yet, over time, markets dictate that wages for
comparably qualified individuals have to increase at roughly the same rate in all industries. As a result, unit labour costs must be expected to rise relatively faster

in the performing arts and education than in the economy overall (p. 4). According to the cost disease theory, the main reason for the rise in costs of higher education is its labor-intensive nature. Therefore higher education institutions are faced with the increased cost of their resources—mainly increase in wages with inflation and in parallel to increases in other sectors of the economy—and the impossibility to substitute these resources or significantly increase productivity (Archibald & Feldman, 2011; Getz & Siegfried, 1991; Johnstone, 2008; Johnstone & Marcucci, 2010; R. E. Martin, 2011).

The rising labor cost—an important part of the cost disease—is magnified by higher education's reliance on skilled labor. Highly educated individuals became greatly sought assets in the new knowledge economy, and the global demand is higher than the supply (Archibald & Feldman, 2011). As a result, the cost of high-skilled labor has increased significantly in the past decades—including the cost of professors—thus contributing to the rise of cost in tertiary education.

The productivity issue that constitutes the other side of the cost disease can be explained by higher education being a productivity immune sector (Johnstone, 2008), meaning that it is hard to increase productivity. Johnstone (2002) remarked that "neither economies of scale nor the infusions of capital that traditionally bring down unit costs in the larger, goods-producing economy seem to dampen cost increases in higher education" (p. 19). The failure of higher education to increase its productivity stems from the fact that teaching a course requires that a professor be present and a classroom made available for a set amount of time every week of the semester. It is very much the same as the

requirement for a concert to have four musicians to compose a quartet and for them to be present two hours (Bowen, 2011). Although there are worthwhile experiments like online and distance education that disrupt traditional approaches to classroom teaching, these requirements—especially the opportunity to interact with the professor—are mostly non-compressible without seemingly jeopardizing quality (Bower, 2001; Phipps & Merisotis, 2000).

Technology

Technology has been known in many sectors, especially as industrialization took place, to decrease the cost of products and production. Archibald and Feldman (2011), Johnstone (2008), Johnstone and Marcucci (2010) among others, argue that the reverse is true for higher education. The improvement of and change in technology has contributed to its rising cost through three main channels (Archibald & Feldman, 2011). First, higher education institutions need to have access to the latest technologies to ensure the quality of its research and instruction. Those technologies are expensive and are changing at a fast pace, requiring constant investment. Additionally, infrastructures need to be renovated to adapt to new technology investments (Bakia, 2000). Second, professors and staff need to be trained regularly to know how to use these technologies, as well as to make sure they can teach students and junior researchers how to use them (Bakia, 2000). Therefore, the cost of technology to higher education institutions exceeds buying and updating software and equipment, it also involves adding human resources to assist in technology uses (Bakia, 2000; Davis Educational Foundation, 2012) as well as the need for a professionalization of the administrative workforce (Clotfelter, 1996). Last,

technology has failed to increase teaching productivity, as quality education is based on relationships (Kim, 2016).

Paradoxically, technology has made higher education costlier than before, and has become a necessary investment for institutions. Having access to these technologies is viewed by the public, students/families, and faculty and administrators as a mandatory quality improvement for both teaching and research (Archibald & Feldman, 2011; Johnstone, 2002).

Competition

The global higher education landscape has become highly competitive in the past decade. Competition between institutions has been flagged as one of the main reasons why the cost of higher education is increasing (Bowen, 2012; Ehrenberg, 2000; Frank & Cook, 1995; Getz & Siegfried, 1991; Johnstone & Marcucci, 2010; R. E. Martin, 2011). In the competition for students, fund, grants etc., institutions are trying to foster their perceived quality by investing more and thus they keep raising the cost of higher education.

Institutional reputation has become essential for attracting the best and brightest, even more so as rankings have become prominent (Ehrenberg, 2010). The increased competition between higher education institutions has triggered a battle for excellence. Exterior signs of quality have become prevalent, thus leading to heavy investments in assets such as new facilities, elite professors, and the latest technologies (Bowen, 2012; Ehrenberg, 2000; Frank & Cook, 1995; Johnstone, 2008). The battle for excellence also leads universities to increase the services to students including dorms, recreational facilities, and counselling staff (Ehrenberg, 2000; Getz & Siegfried, 1991). Frank and Cook (1995) characterised this phenomenon as the "winner-take-all society," where elite institutions drive the cost of all higher education upwards through excessive spending.

Interestingly, there is no proven association between expenditure and quality. Bowen's revenue theory of costs however helps understand the incentive for institutions to invest significantly (Bowen, 1980; Martin, 2011). Because they are not driven by profit, most institutions have little motivation to cut costs. This situation stems from the fact that institutions are partly subsidised publicly, that they can be protected from competition through location or differentiated services, and that there is seldom evidence of the relationship between expenditures and outcomes. This last rationale in the revenue theory of cost is particularly interesting in the discussion of competition and financing. According to Bowen (1980) institutions tend to accept blindly the belief that the more they spend the better the outcomes they can achieve. The competition between higher education institutions to attract students and faculty translates into a competition of highest spending. Institutions therefore try and raise as much money as they can and spend it all, constantly increasing the cost of higher education.

But the rise of cost is more closely linked to quality than what has been demonstrated before. The rising cost of higher education is not only linked to universities trying to improve the quality of their services, the cost itself is a signal of quality to stakeholders. The "Chivas-Regal effect" can indeed be applied to higher education: the price paid is seen by the consumer—the student—as a proxy for the quality of the produce—education (Martin, 2011). Therefore, a higher cost of education (often indicated to students via high tuition sticker prices and extensive on-campus resources) is

19

perceived as high quality, and higher education institutions have no interest in cutting these costs.

The cost disease, technology, and competition are the three most relevant rationales to the rising cost of higher education, but definitely not the only ones. Resistance to change (Bowen, 2012; Johnstone & Marcucci, 2010), complex governance shared with faculty (Getz & Siegfried, 1991; Ehrenberg, 2000), external stakeholders (Ehrenberg, 2000), supply-side problem—such as the failure to provide seats in a mandatory course—and mismatching—student self-selection into institutions they are over-qualified for—leading to increased time-to-degree and drop-out rates (Bowen, 2012), market forces as demand is superior to capacity (Johnstone, 2008), and government regulations (Getz & Siegfried, 1991) also participate in the rising cost. These forces have led to the per-student cost increasing faster than inflation (Johnstone, 2008).

Massification and its Impact on Costs

The rise of the per-student cost of higher education needs to be put in the context of massification, since a higher number of students means a higher cost nationally. Massification is defined as the massive increase in the number of students seeking access to tertiary education and is seen as one of the most critical forces affecting higher education in the 21st century (Altbach, 2007; Trow, 2006).

Theory and Reality

The main theory behind massification is the typology established by Trow (2006), where he characterises a system as "elite" if less than 15 percent of the relevant age-

group participate in higher education, "mass" if 15 to 50 percent participate, and "universal" if more than 50 percent participate. As developed economies approach to the universal stage (UNESCO Institute for Statistics, 2013), it could be argued that this typology becomes less useful as it fails to distinguish any stage beyond a 50 percent participation rate. It is, however, still valuable for gauging the status of developing economies in particular.

Trow's typology (2006) is also problematic in that it relies only on a single statistic-the gross enrollment ratio (GER) -while several statistics are used in the literature to quantify a country's enrollment growth and participation (Johnstone, 2008; Johnstone & Marcucci, 2010; Trow, 2006). The rate of growth and the absolute number of students are two examples of such statistics. The rate of growth and the GER are the most interesting ones as they respectively show the changes through time and embed the information in the demographic context. More specifically, the GER takes into account the demographics by expressing enrollment as a percentage of the age-relevant population and the rate of growth shows the change in enrollment through time. The absolute number of tertiary students is less informative as it fails to include the national and historical contexts. However, as exemplified in Table 2.1, more than one statistic is often needed to provide a comprehensive view of what a system of higher education is going through. A good example is Sub-Saharan Africa that had a very low GER of 8 percent in 2012. However, the growth in the number of students between 1999 and 2012 is one of the highest worldwide at 181 percent (UNESCO Institute for Statistics, 2015). This shows the intricate complexity of increasing enrollment at an age of demographic

21

growth. Trow's typology would have described the system as still elite, and thus poorly portrays the important massification in this region.

	Percentage Gross enrollment ratio (18-24 year growth (1999 to olds)		Trow's typology	
	2012)	1999	2012	III 2012
North America				
and Western	38	61	79	Universal
Europe				
Central Asia	54	20	24	Mass
Central and	60	40	71	Universal
Eastern Europe	00	40	/ 1	Ulliversal
Arab states	83	19	26	Mass
Latin America	119	21	42	Mass
East-Asia and Pacific	149	14	31	Mass
Sub-Saharan	181	4	8	Elite
South and West Asia	245	8	23	Mass
World	>100	18	32	Mass

Table 2.1. The massification of higher education worldwide

Source: (UNESCO Institute for Statistics, 2015)

Table 2.1 is also useful to quantify, beyond Trow's classification, the massification of higher education in the world. Though the rate of growth has decreased in developed economies, as theorised by Johnstone and Marcucci (2010), developing economies are experiencing an exponential growth in the number of students accessing higher education. Massification is thus becoming a truly global phenomenon that took place in developed economies after World War II (Trow, 1973) and that is still happening in many developing economies. In most regions in the world, the absolute number of students is rising—a phenomenon that has a prominent effect on cost and financing.

Reasons for Higher Demand

The massification of higher education stems from a complex array of pressures that impact the tertiary system simultaneously. First is the demographic growth in many countries (mostly low- and middle-income ones) that leads to an increase in the absolute number of college-age individuals (Johnstone, 2008; Johnstone and Marcucci, 2010). Second is the growing participation rate globally, except for a few developed countries such as Japan and Russia (Johnstone, 2008; Johnstone and Marcucci, 2010). The higher share of young people that are willing to enrol in higher education is linked to the higher number of students completing secondary education, the perception that higher education is valuable in a scarce job market, and the implementation of policies to encourage enrollment in an attempt to foster social justice and mobility (Johnstone & Marcucci, 2010; Marcucci & Usher, 2012; Trow, 2006). Two additional factors influence the participation rate to a lesser extent but still play a substantial role in massification. First is the increase in the number of lifelong or adult learners, that is students who are not traditional university age but return to higher education to advance their careers or acquire new skills (Johnstone, 2008). Second, as a result of the increased complexity of knowledge and the attempt of professions to raise their status by requiring additional qualifications, the number of years to complete a degree has extended significantly (Johnstone, 2008; Johnstone and Marcucci, 2010). This issue has been addressed by policy-makers in some regions already, notably in Europe where the Bologna process decreases the duration of the Bachelor degree to three years, in part to reduce cost to students (Duclaud-Williams, 2004). This last factor is linked to the evolution of the knowledge economy, a system of production characterized by its reliance on intellectual

capital and that therefore requires a higher number of educated workers. All these trends have led to an important increase in the number of students worldwide, which needless to say has an impact on educational cost.

Massification and Cost

The impacts of the global massification of higher education are varied. They include the emergence of differentiated systems, the enrollment of an increasingly diverse population of students, the rise of the private sector, and an overall decline in quality (Altbach, 2007). However, the impact on the cost of higher education is of greatest relevance for this discussion. As argued above, the rise in the cost of higher education is impermeable to the higher number of students, as higher education is productivity immune. Therefore, higher education is currently experiencing both a substantial rise in the per-student cost and a massive increase in the number of students enrolling (Johnstone & Marcucci, 2010; Marcucci & Usher, 2012). This means that, at the system level, the total cost of educating tertiary students is ascending steeply. Even in countries where the number of students is stabilizing, the increasing per student cost means that systems are faced with growing costs. In this context, the question of the financing of higher education is paramount.

Higher Education as a Public Good

Higher education financing varies significantly from country to country and is heavily dependent on how it is defined in both the political and cultural contexts. Where higher education is considered primarily a public good, educating individuals to the tertiary level is understood as benefiting the nation as a whole. Government investment in higher education, therefore, is viewed as compulsory. In contexts where higher education is viewed as a private good, tertiary education is considered as mostly beneficial to the individual, who is expected to pay for it. Understanding the difference between the two is essential for characterizing higher education financing in a global context.

Samuelson (1954) described public goods as non-rivalrous and non-excludable. Goods can be qualified as public only if they can be consumed without leading to their exhaustion and if their benefits extend beyond the consumer (Marginson, 2007; Samuelson, 1954). This definition of public good is more and more criticized as very few goods seem to be able to satisfy both criteria and as public intervention is erroneously used as a proxy for the definition (Marginson, 2007; Woolley, 2006). Despite global claims that it is a public good, higher education fails to fully meet Samuelson's definition. Indeed, some benefits of tertiary education can be limited to the individual, thus making it excludable, and the best institutions have a limited number of seats, making entry to these rivalrous (Marginson, 2007). Therefore, new theories have been developed, examples of which include emphasis on the theory of externalities instead of the public goods (Woolley, 2006) or new definitions such as: "Public goods are goods that (1) have a significant element of non-rivalry and/or non-excludability, and (2) goods that are made broadly available across populations" (Marginson, 2007, p. 315). Despite these theoretical disputes, there is general agreement that higher education provides benefits to the society as a whole.

25

Economic Benefits

The first benefits are economic and stem from the theory of human capital. This theory posits that capital is not limited to financial and physical assets, but exists under other forms – including schooling, medical care, migration, and professional training – which explains the difference observed between economic growth and investment in traditional forms of capital (Becker, 1975; Mincer, 1981; Schultz, 1961). This form of capital is referred to as human capital "because people cannot be separated from their knowledge, skills, health, or values in the way they can be separated from their financial and physical assets" (Becker, 2007, p. 248). Education can be qualified as human capital because it cannot be separated from the individual it belongs to, and also because it generates additional wealth for people who have it. Investment in human capital is fundamental at a macroeconomic level to the economic growth of a nation or society.

The impact of human capital on national economic growth implies that educating a whole population has advantages for the society. This idea is supported by Solow's macroeconomic model in which economic national growth does not only depend on the amount of labor available but also on its quality as defined by its level of human capital (Mankiw, Romer, & Weil, 1990). In this argument, the aggregate production function considers a complementarity between human capital and physical capital. Mincer (1981) proposes two reasons why human capital is a key instrument for national economic growth. First, it is a factor of production, i.e. an input into the economy that helps generate profit (Bloom, Hartley, & Rosovsky, 2007; Institute for Higher Education Policy [IHEP], 1998; Vossensteyn, 2009). Second, it is a source of technological improvement, as it generates new scientific knowledge. This implies that education may have a multiplicative effect not only impacting the type of labor available but also the technologies of production. This theory assumes that education will produce new knowledge, an assumption emphasized by Becker's (2007) recognition that higher education is essential because "economic growth closely depends on the synergies between new knowledge and human capital" (p. 248). In today's knowledge society, higher education could therefore be considered as the noblest form of human capital since it is essential for the economic growth and global competitiveness of a country.

Though human capital theory insists particularly on improved productivity gained through education, other public economic benefits exist including increased tax revenue, higher consumption, and increased workforce flexibility (Bloom et al., 2007; IHEP, 1998; Vossensteyn, 2009). Additionally, educated individuals are likely to cost less to the government over their lifetime, as they are less prone to rely on government financial support (Bloom et al., 2007; IHEP, 1998; Vossensteyn, 2009). People with higher levels of education also have better health: on average in the OECD countries, 88 percent of adults with tertiary education report being in good health, opposed to 79 percent in the general population (Organisation for Economic Co-operation and Development, 2014a). As the costs of healthcare continue to increase everywhere in the world, this difference becomes non-negligible and generates benefits that are accrued by society. Further evidence also suggests that educated workers are likely to postpone retirement (Peracchi & Welch, 1994), making them productive for longer periods of time in the workforce and better prepared financially (Lusardi & Mitchelli, 2007). Individuals educated to the tertiary level, therefore, do not only contribute more to the government through taxation,

27

but they also receive fewer benefits. These rationales make higher education particularly valuable to the economic health of society.

Social Benefits

The theory of human capital does not restrict itself solely to economic benefits. Social externalities, i.e. the unintended consequences to improving human capital that benefit the society, affect areas as varied as entrepreneurship, civic participation, and crime reduction. The spill-over benefits of human capital succeed in assuring economic growth and development by positively affecting society as a whole. As a form of human capital, higher education has many externalities that contribute to the enrichment of society (e.g. Bloom et al., 2007; IHEP, 1998; OECD, 2014; (Pusser, 2002); Vossensteyn, 2009).

Externalities that benefit the direct social environment. At a local level, environments receive benefits from the availability of educated workers. Bloom, Hartley, and Rosovsky (2007) proposed several examples of how educated adults positively affect their direct environment. For instance, college-educated workers improve the performance of non-educated workers working alongside them. Another example is that more educated people are more likely to create their own firm, and highly educated entrepreneurs tend to create more jobs than less-educated ones. Other externalities suggested in the literature include reduced crime rate, less poverty, more social cohesion, and more tolerance to diversity (Bloom et al., 2007; IHEP, 1998; OECD, 2014; Putnam, 2001; Vossensteyn, 2009). Putnam (2001) also showed that, at the community level, the education of an individual had a positive effect on the general happiness of the population. Additionally, educated adults give higher amounts to charity and participate more in community services (IHEP, 1998; OECD, 2014; (Uslaner, n.d.); Vossensteyn, 2009). This evidence is suggestive of some noteworthy benefits from higher education that lie beyond the individual level.

Externalities that benefit the whole society. Human capital gained through education, and more specifically through higher education, also has positive externalities for the society as a whole. Individuals with college degrees tend to be more civically engaged and participate at higher rates in the government of their country. In OECD countries, adults with higher education are 30% more likely to believe that they have a say in the government (OECD, 2014). This indicator is mirrored in many reports showing that higher education is a pathway to better citizenship. Educated citizens are more likely to vote, write to politicians, and attend local political meetings (IHEP, 1998; Uslaner, n.d; Vossensteyn, 2009). Putnam (2001) as well as Rosenstone and Hansen (1993) agree that education is paramount to improving civic engagement, a feature that is necessary for fostering social capital through building a sense of citizenship. Moreover, Collins and Rhoads (2008) maintain that higher education is a tool to achieve nation-building, as it favours the conservation of local traditions and the advancement of national identity. In this area, philosophers agree with economists in acknowledging the value of higher education for democratic participation. Gutmann (1999) insists that the education of children through schooling is the best way to ensure the sustainability of a democracy. Thus education is a leverage that drives the democratic good. Similarly, Dewey (1916)

emphasizes the social role of education: it fosters the growth of democracy and perpetuates its aims. According to these two philosophers, the role of education is to shape citizens that will take care, sustain, and improve democracy – the latter implying the need for higher education to develop critical thinking. It is therefore in the government's own interest to guarantee that all their citizens are educated to the higher education level.

Though little quantitative evidence exists on the extent of higher education's externalities, most economists agree that higher education improves welfare. Higher education also participates globally in the production of knowledge, the improvement of literacy, the fostering of culture, and the balancing of social opportunities, all of which can be considered public goods (Marginson, 2007; Stiglitz, 1999). Therefore, higher education is an enterprise that, independently of the context or the financing mechanism, has a paramount public impact, both economically and socially. This provides a strong argument for the public financing of colleges and universities.

Financial Austerity and Fragility

Although higher education is greatly beneficial for the society, governments have been systematically disinvesting, braving historical and/or theoretical assumptions that they should be paying for higher education. This disinvestment is the consequence of negative forces – including the rise in cost and in the number of students as well as competing public needs – that challenge the sustainability of high quality public higher education provided by governments.

Scarce Public Resources

Worldwide, public resources remain by far the most important financial resource for the majority of institutions in the public systems of higher education (Johnstone, 2008; Johnstone & Marcucci, 2010; Weisbrod & Asch, 2010). On average, OECD countries provide 69.2 percent of the expenditure of higher education institutions, while the few data the UNESCO were able to collect amount to an 80 percent global average over the past decade (OECD, 2014; UNESCO Institute for Statistics, 2015). A more detailed evaluation of OECD data shows that only 7 countries among 29 finance less than 50 percent of their tertiary sector (see Figure 1) while the remaining countries fund a significant share of higher education.



Figure 2.1. Share of public expenditure on tertiary institutions for OECD countries

Source: (OECD, 2014)

The availability of public resources for higher education in an era of costs and enrollment increase has been put to the test. The consequence has been faltering public revenues in most countries (Hauptman, 2006; Johnstone, 2008, 2009; Johnstone & Marcucci, 2010). The state of financing in countries all over the world is unlikely to improve: Pierson (2002) remarked that welfare states are now in a condition of "permanent austerity" —a remark that was echoed by Johnstone (2013) talking about the "continuing austerity" of American universities. Pierson (2002) argues that changes in the global economy, slowdown of economic growth, population ageing, and maturation of the government commitment are the causes of this perennial state of austerity. While he only applied this logic to welfare states, it can be argued that most of these factors are now impacting other countries too. Therefore, our world seems to be experiencing a state of "permanent austerity" and a global retrenchment of the welfare state, which means financial hardship for the publicly funded institutions – including higher education ones.

Austerity

Global higher education austerity is due to several competing economic forces that prevent nations from meeting the needs of increased enrollment and cost. First, public revenue comes from the taxpayers and the countries' capacity to tax is limited and dependent on the overall state of the economy and the country's technical capacity to implement taxation (Johnstone, 2002, 2009; Johnstone & Marcucci, 2010). This leads to problems in high-income countries where the economy is stagnant or declining and where there is an overall reluctance to increase taxes (Johnstone, 2008; Marcucci & Usher, 2012; Weisbrod & Asch, 2010). In middle- and low-income countries, the lack of infrastructure to control and monitor income and/or sales is an important issue, sometimes seconded by a culture of tax evasion (Johnstone, 2002). Second, globalization has created issues when it comes to getting more revenue from taxpayers (Johnstone, 2002). Offshoring has become easier, making it risky for governments to increase corporate taxes. At the same time, supranational economic alliances are making it impossible for countries to rely on quick and easy fixes like creating inflation through the printing of money (Johnstone, 2002). Finally, all countries are experiencing compelling needs that take prevalence over higher education for public funding – including social security and pensions in high-income countries, and primary and secondary education in middle- and low-income countries (Johnstone, 2002, 2008, 2009; Johnstone & Marcucci, 2010; Marcucci & Usher, 2012). Higher education has been relegated in the queue of public needs by the fact that it has been capable of functioning with less or without funding (Johnstone, 2002). All these factors have prevented governments from significantly increasing their revenue and the share devoted to higher education, thus stopping them from adequately supporting the ever-growing systems.

The scarcity of public resources as well as the difficulty to gather unstable private ones (Johnstone, 2008, 2009; Weisbrod & Asch, 2010) have started a period of austerity and retrenchment in higher education worldwide. Manifestations of austerity—for instance brain drain or poor conditions for studying—can be seen everywhere independently of the wealth or development of the country (Johnstone & Marcucci, 2010). Consequences of austerity weigh on both institutions and students (Johnstone, 2002). For institutions, such consequences include the inability to adapt to change, the loss of staff, the use of out-dated equipment, as well as the inadequacy of facilities in condition and size (Johnstone, 2002). For students, the consequences depend on the response of institutions to the lack of financial resources. This can include the augmentation of tuition fees, the shortage of seats, changing to part-time status, favouring an institution they can commute to, and deciding not to attend tertiary education (Johnstone, 2002).

Austerity is unfortunately a reality in the higher education field today. Interestingly, while higher education austerity is independent of political views, solutions will have to take into account the political context and the cultural status of higher education (Johnstone & Marcucci, 2010). Worldwide, however, financial austerity is worsened by many other realities that impact strongly higher education and contribute to its fragility.

Fragility

The current state of most higher education institutions and systems worldwide has been described as fragile (Johnstone, 2008), which is accounted for as follows: "the fundamental cause is a natural trajectory of costs, or necessary expenditures, that tends in most years and in most countries to outpace the natural trajectory of revenues, both for institutions and (even more) for systems" (p. 31).

While sometimes fragility and austerity are used to designate the same phenomenon (Johnstone, 2002, 2009), in this dissertation, I use austerity to describe a state where resources (especially financial) are scarce, and fragility to describe a more permanent state that stems not only from austerity but also from other pressures put on the systems and institutions. Faltering and unstable revenue, both from public resources and from private resources leads to a pervasive austerity crisis in higher education that touches institutions and systems independently of their type, status, endowment, etc. (Johnstone, 2008). At a time of growing enrollment and needs, the government is pointed out as the main reason for the fragility of tertiary education, as it not only fails to provide sufficient public resources, but it also regulates heavily the possibility for public institutions to gather private funding (Johnstone, 2008). Recent trends that emphasise accountability (Schmidtlein & Berdahl, 2011) are leaning on two evolutions of interest here: the scarcity of public resources, which increases the desire of the government to make sure that they are well used, and the lack of trust in higher education institutions which are seen as unresponsive and wasteful (Johnstone & Marcucci, 2010). Additionally, the inflexibility of national laws on academic employment—e.g. tenure or civil servant status—adds pressure costs that increase the fragility of higher education institutions (Johnstone, 2008).

The fragility of higher education is therefore the result of several factors that heavily impact higher education simultaneously—including austerity and regulations. Many systems worldwide are experiencing an era where they are uncertain of the future of the system as well as of individual institutions. It seems that both could collapse in an instant, thus deserving the adjective "fragile." As a consequence, even though higher education has public benefits, and could be considered a public good, the current state of finances coupled with increasing enrollment makes it difficult for government to sustain institutions financially. By disinvesting in higher education and supporting new financing schemes, governments seem to agree that higher education's public benefits are outweighed by its private benefits. Current financial trends tend to indeed endorse the view that higher education is a private good.

Higher Education as a Private Good

Private goods are defined in opposition to public goods as rivalrous and excludable (Samuelson, 1954). This definition breaks the dichotomy public/private by acknowledging the existence of goods outside of this typology – for instance rivalrous and non-excludable ones. As the public/private distinction is essential in higher education, Marginson (2007) defines private goods as those that do not meet the criteria of his definition of a public good. In the literature, higher education is generally defined as a private good when its private benefits are considered more important than the public ones.

Human capital, and therefore higher education, is first and foremost acknowledged as an instrument of personal economic growth, as "wages of a worker are proportionate to the size of his human capital stock" (Mincer, 1981, pp. 7–8). This means that more educated workers, those possessing larger amounts of human capital, earn higher wages and have more personal wealth. The human capital theory asserts that differences in wages are due to differentials in the magnitude of human capital stock, a reflection that corroborates Adam Smith's reflection on individual productivity (1776). Becker (1975), Mincer (1981), and Schultz (1961) – the three pioneers of human capital – affirm that the rate of return on education is important, even when considering the opportunity cost of being in school rather than in the workforce. On average in the OECD countries, individuals with vocational higher education earn 30 percent more than adults with upper-secondary education, and individuals with academic higher education earn 70 percent more (OECD, 2014).

Similar to public benefits, private benefits can be sorted into economic and social ones, both of which increase the worth of an individual in the economy. To some extent, private benefits are more straightforward than public ones and easier to calculate, as they only concern one individual.

Economic Benefits

There is a plethora of individual economic benefits for individuals who completed higher education. First and foremost is the fact that individuals educated to the tertiary level earn higher salaries and benefits as a result of their higher productivity and better employment (Bloom et al., 2007; IHEP, 1998; Marginson, 2007; Vossensteyn, 2009). Their working conditions are also often better than for individuals who did not achieve higher education (Bloom et al., 2007; IHEP, 1998). Consequently, individuals with higher education accumulate higher savings over their lifetime, and are therefore able to better prepare financially for the future (Bloom et al., 2007; IHEP, 1998; Vossensteyn, 2009). An additional private benefit of higher education is the higher personal and professional mobility it allows (Bloom et al., 2007; IHEP, 1998; Vossensteyn, 2009), thus enabling individuals to continuously improve the development of their career.

Social Benefits

Individuals educated to the tertiary level also typically enjoy an easier and less worrying life. This includes first and foremost enhanced health and a higher life expectancy than people who did not graduate from a tertiary education institution (Bloom et al., 2007; IHEP, 1998; Vossensteyn, 2009). The quality of life of higher education graduates is also enriched by their propensity to enjoy and value more hobbies and leisure activities (Bloom et al., 2007; IHEP, 1998; Vossensteyn, 2009). Higher job satisfaction as well as a penchant for educational enrichment and personal development doubtless contribute to this enhanced quality of life (Bloom et al., 2007; IHEP, 1998; Vossensteyn, 2009). Overall, it seems that higher education graduates are healthier and happier than their peers, a characteristic that spreads to their children (Bloom et al., 2007; IHEP, 1998).

The human capital gathered through higher education also allows for better consumer decision making, thus enabling better choices of investment (Bloom et al., 2007; IHEP, 1998; Vossensteyn, 2009). This helps altogether sustain the familial quality of life. Additionally, higher education graduates enjoy a higher status in society (Bloom et al., 2007; IHEP, 1998; Marginson, 2007; Vossensteyn, 2009).

Therefore, the theory of human capital and externalities show that higher education has extensive benefits both for the individual and for the society it belongs to. Our capitalist society and the global state of austerity have led to the favouring of the private good philosophy in recent years, but there is no fully-accepted evidence that one philosophy should be preferred to the other.

Rate of Return on Higher Education

In an attempt to solve the public good/private good debate, that is at the heart of the issues of financing higher education and is especially important in the case of free-

tuition higher education, many studies have attempted to calculate and compare the private and public economic returns of human capital (Psacharopoulos, 1994; Psacharopoulos & Patrinos, 2002). These studies usually calculate a percentage called the rate of return: it symbolizes the income earned on a past investment while taking into account the change in value through time. Private returns to higher education are generally found to be higher than public ones, though the estimation of social benefits and externalities is extremely hard and therefore might be underestimated (Psacharopoulos & Patrinos, 2002). While global private return to higher education in 2002 reached 19 percent, the public ones were only evaluated at 10.8 percent (Psacharopoulos & Patrinos, 2002). Recent OECD (2014) estimates suggest 13.9 and 13.2 percent private rates of return for males and females respectively, consistent with evidence that rates of returns for education have been decreasing (Psacharopoulos & Patrinos, 2002). Similarly, public returns for OECD countries were around 11.9 percent for males and 10.5 percent for women (OECD, 2014). Evidence has also shown that private returns are regressive on the level of development of the region or country, meaning that individuals gain more by graduating from higher education in low-income countries than in high-income ones (Psacharopoulos & Patrinos, 2002). This is reasonable when considering that higher education is still an elite system in low-income countries, while it has become the norm in high-income countries with universal access.

Although the calculation of the rate of return of education has multiple limitations, it is an easy indicator for people to understand and policy makers to use. Figures support the idea that higher education is first and foremost a private good, since its private returns are higher than public ones. These quantitative indicators have been used to endorse cost-sharing mechanisms that allow individuals to pay for part or all of their tertiary education.

The Concept of Cost-Sharing

The notion of cost-sharing in higher education stems from the assumption that the cost of higher education can only be borne by a limited number of parties in a zero-sum game: government, students and their family, and donors (Johnstone, 2004; Johnstone & Marcucci, 2010). Though there is evident ground for public investment in higher education, the state of financial austerity and fragility experienced worldwide led to the necessity of stakeholders other than the government bearing a higher share of the cost (Johnstone, 2003, 2004b; Johnstone & Marcucci, 2010; Vossensteyn, 2009). Since institutional or individual donors cannot be considered sustainable sources of financing, cost-sharing is defined as "a shift in the burden of higher education costs from being borne exclusively or predominantly by government, or taxpayers, to being shared with parents and students" (Johnstone, 2003, p. 351).

The Different Forms of Cost-Sharing

Cost-sharing can take different forms including: setting up tuition fees where there were none before, the creation of a fee-paying track while mainstream students receive free higher education, a rise in tuition fees, charging students for services that were previously offered or heavily subsidised such as housing and food, the reduction of grants or scholarships, reducing the subsidies of student loans or increasing interests, or the restriction of seats in the public sector to shift enrollment to the private sector (Johnstone, 2003, 2004; Johnstone & Marcucci, 2010). Depending on the financing scheme and cultural context, governments can use one or more of these techniques to lower their share of the cost of higher education, and by doing so increase the share that students and their families pay. Recent examples of public reforms based on a cost-sharing principle include the United Kingdom instituting tuition in 1997, the Australian scheme using income-contingent loans created in 1989, and the establishment of a fee-paying track in Russian public universities (Johnstone, 2004).

Rationales for Cost-Sharing

As cost-sharing becomes prominent worldwide, it is important to explore its rationales. The first one is economic, as cost-sharing can be seen as an improvement in equity and efficiency (Johnstone, 2003, 2004b; Teixeira, Johnstone, Vossensteyn, & Rosa, 2008). From an equity perspective, cost-sharing allows parents who can afford to pay to participate in the cost of higher education. This is most convincing in systems where

(1) higher education is still partaken of by relatively few; (2) those "relative few" are predominantly from upper middle or upper classes; (3) the taxes that the government uses in support of the so-called "free" higher education come from relatively proportional or even regressive taxes on sales or businesses, or from the printing of money [...]; and (4) the provision of "need-based," or "means-tested" grants and generally available loans is limited. (Johnstone, 2004, p. 407)

In opposite systems, i.e. with wide access uncorrelated with parental status, where taxes fall mostly on the richer strata of society, and where a grant system is well-developed, the equity argument is not as strong.

Concerning efficiency, under cost-sharing paying students and their family become more invested consumers and institutions become more cost-conscious (Johnstone, 2003, 2004; Teixeira, Johnstone, Vossensteyn, & Joao Rosa, 2008). Additionally, institutions' responsiveness can increase as they need to be aware of societal and individual demands to be competitive (Johnstone, 2003, 2004; Teixeira, Johnstone, Vossensteyn, & Joao Rosa, 2008). Increased efficiency and responsiveness are direct consequences of higher education becoming a marketed good.

The second rationale behind cost-sharing is simply the need to increase revenue for higher education. The landscape of financial fragility and austerity worldwide has been painted before, and there is no doubt that this last rationale could indeed be sufficient on its own today (Johnstone, 2003, 2004; Teixeira, Johnstone, Vossensteyn, & Joao Rosa, 2008).

The Importance of Context

Cost-sharing is no doubt a very contested system. Its success and even the possibility of its implementation depend on the political, social, and cultural contexts (Johnstone, 2008). Teixeira, et al. (2008) identified six contextual factors that signal the necessity of cost-sharing to the population:

• Low enrollment compared to similar countries as it indicates a need to increase access possibilities

- Limited government revenues
- Increased tax-revenues would mostly impact low-socioeconomic strata
- The tuition increase is supported by an adequate increase in grants, loans or other aids
- The current system is inequitable
- Long queue of unmet public needs, in which higher education ranks low.

While these contextual factors can help governments in the establishment of cost-sharing by signalling higher education financing issues, other factors can have the opposite effect, such as the absence of technical means to set up student aids through mean-tested grants or income contingent loans (Johnstone, 2004).

The financing of higher education is a complex issue that plays on theories such as the public and/or private benefits of higher education. It is important to note that in the contemporary context of massification and rising cost, full public financing of higher education is not sustainable anymore. Logically, most governments are turning to some form of cost-sharing to students' despair. While tuition increases receive a lot of attention globally, less is said on the countries that continue to resist and where higher education is free. The following chapter therefore takes a closer look at these countries that (seem to) resist the global trend.

3. TUITION-FREE HIGHER EDUCATION

Landscape and History

Free higher education is still very much an important phenomenon in the world, that in an age of austerity and faltering governmental funding merits further analysis. Johnstone and Marcucci (2010) provided a list of 48 countries where public institutions do not charge tuition fees to students, excluding countries that implemented dual-track systems—some of which still provide an important share of students with free higher education. A revision of this list included 50 countries with no fees or only nominal fees (Marcucci, 2013). A more recent enterprise has been undertaken by the World Policy Analysis Center (2017) that has been monitoring whether countries report the existence of tuition fees or not in the public sector. An early report of this initiative counted a total of 79 countries reporting no tuition: 16 low-income, 41 middle-income, and 22 highincome (Heymann & McNeill, 2013). The current updated map totals 81 free-tuition systems.

A comparison of these two sources, and further research in case of contradiction between them, led to a total of 85 countries that offer some type of free-tuition higher education (see Figure 3.1), to which Scotland should be included. The majority are located in Africa (25) and Europe (25). South America is notable with 9 countries out of 13 that have free public systems, while Central America has 7 (including Mexico and some in the Caribbean). Concerning the Middle East, 8 countries have free tuition systems. With only 11 free tertiary systems of education – most of them located in Central Asia, the Asian continent seems to have well-developed cost-sharing mechanisms.

The geographic distribution of this information provides a pattern of country clusters that still have some kind of free public higher education. Four main clusters can be distinguished: Latin America, Northern Africa and MENA, the Nordic countries, and transitional (or ex-Soviet) countries.

Each cluster includes very different countries at various stage of economic development (see Figure 3.2), emphasizing the omnipresence of tuition-free systems among countries that have little in common. Using the World Bank classification, I obtain that the majority of free countries are well-off: 29 are high-income countries and 22 are upper-middle income countries. With a further 20 lower middle income countries and 14 low income ones, I find quite a balance of countries of all types. Therefore, free tuition higher education does not seem to be limited to developed economies, and its reason for existence should be found in historical or political contexts rather than economic ones.



Figure 3.2. Development level of countries with free higher education



The historic rationales behind the institution and maintenance of free higher education in these countries vary widely, shedding light on the importance given to education by different political systems. The Nordic countries have always been considered emblems of the welfare state (West, 2013): the importance they put on human beings and social equity makes it inevitable for them to propose free higher education to all. Transitional countries owe their free-tuition system to their communist past (Johnstone & Marcucci, 2010), and the desire to abolish social classes through a completely egalitarian system. The socialist-Marxist view is also said to have influenced East African countries in their decision to keep free systems of higher education (Johnstone & Marcucci, 2010). In Latin America, free tuition is anchored in the view of higher education as a basic social obligation and a deep mistrust in the private sector (Adrian, 1983). To this day, the social role of the university remains extremely important in this region.

But free higher education is often much more than an historical and political feature: its roots are profoundly anchored in philosophical stances that have become part of the national cultures. The theories and philosophies behind the phenomenon of free higher education are worth exploring to better understand the issues such countries might be facing and the stakes at play.

Rationales Behind Tuition-Free Higher Education

While many countries have attempted to eliminate or reduce the scope of their free-tuition higher education systems, economic, social, philosophical, and cultural

rationales make it difficult for them to change. These rationales explain why free-tuition higher education has persisted and is being sustained across many countries.

I already mentioned economic and social rationales that tend to enable the categorization of higher education as a public good. These arguments can and are being used to show that higher education is a worthwhile investment for society. However, other—maybe more philosophical—rationales exist that are detailed in this section.

Higher Education as a Right

If considered a right, higher education should be made available to all without any obstacle to access, including without financial obstacles. Indeed, Power assesses that if education is considered a right, "every person in society is entitled to equality of educational opportunity. If obstacles to opportunity exist, they should be removed" (1982, p. 213). Thus, society has to provide adequate opportunities for all citizens to benefit from the right to higher education. Higher education as a right coupled with the ideology of equality is one of the most used arguments to justify free tuition in higher education systems. Two theories can be used to justify the right status of higher education: the welfare and the justice theories.

Higher education as a welfare right. T. H. Marshall (1950) was the first to define social rights and what welfare states should provide to their citizens. He stated that citizenship is a "principle of equality" (Marshall, 1950, p. 33) and defined the social element of citizenship as follows:

the whole range from the right to a modicum of economic welfare and security to the right to share to the full in the social heritage and to live the life of a civilised

being according to the standards prevailing in the society. (Marshall, 1950, p. 11) The last part of this definition is fundamental and states that every citizen is to have the right to live according to the standard of the society they live in. Because of the exponential massification of higher education, the gross enrollment ratio now exceeds 50 percent in a majority of developed economies, thus making tertiary education the current norm. While developing economies have not reached these levels yet, as they have only just begun their expansion, there is no question that universal higher education will be a global standard in the decades to come. Therefore, the state should be fully responsible for higher education as a social right given to its citizens.

T. H. Marshall (1950) also emphasises that the right to education is entangled with a duty for the citizen to be the best he can for society's sake – and it can be argued that society nowadays needs tertiary educated citizens. He goes further and states that the right to a certain standard of education is necessary for the quality of citizens and the "health" of society. He agrees that this will not erase inequalities between social classes, but will allow some type of justice by levelling the playing field of opportunities at the scale of the citizen: "the equality implicit in the concept of citizenship, even though limited in content, undermined the inequality of the class system, which was in principle a total inequality" (Marshall, 1950, p. 30).

Under such a definition of social rights, there is no denying that higher education is one in the contemporary society. It therefore follows that under this right-based perspective, welfare states should intervene in all levels of education to make sure that each citizen has equal opportunities and to reduce inequalities by insuring everyone a minimum socioeconomic status.

Higher education as a just right. Higher education is more than a social right, it can also be considered a just right. Refusing higher education to a part of the population or erecting barriers that would prevent some to access higher education is an injustice as it fosters inequalities. Therefore, higher education can be considered a just right, as only by making it a right can it cease being a vehicle for injustice and become a tool for justice in the society.

In his seminal work, *A Theory of Justice*, Rawls (1999/1971) affirms the importance of justice as a virtue to build a fair and equal society. Rawls (1999/1971) puts the principle of justice above any other paradigm in the governance of social institutions. In doing so, he argues for strict egalitarianism in the society, thus adding his definitions to the tradition of distributive justice (Lamont & Favor, 2013). However, Rawls' theory is more about equity than equality. Indeed, for Rawls a just equality can only be achieved through the use of rights by the state to mitigate the inequalities that are inherent in contemporary societies. Rights should aim at improving the well-being of those that are worst off.

Concerning higher education, it represents an unfairly distributed resource, since students from high socio-economic background have higher chances to access and graduate (Forsyth & Furlong, 2000; James, 2002). This is unjust because it deprives some citizens from resources that would enable them to have better opportunities in the future. In fact, equal opportunities to access higher education would improve equal opportunities when it comes to the labor market and therefore directly address the second part of the second principle of justice according to Rawls: "social and economic inequalities are to be arranged so that they are [...] attached to offices and positions open to all under conditions of fair equality of opportunity" (Rawls, 1999/1971, p. 266). Higher education is also unfair because it privileges a group that does not need to be privileged, and therefore the system needs to change to be biased toward lower socio-economic strata. This would agree with the first part of Rawls' second principle for justice, also known as the difference principle: "social and economic inequalities are to be arranged so that they are [...] to the greatest benefit of the least advantaged, consistent with the just savings principle" (Rawls, 1999/1971, p. 266)

Higher education can therefore be considered a social right, in the welfare-state tradition, and a just right, in the justice tradition. In both cases, free tuition seems to be a condition to making sure that this right is fully exercised by all. If higher education is recognised as a right, then society needs to remove all obstacles to access and especially tailor the policies to the least-advantaged – thus acknowledging its double status as a social/welfare and just right. Free tuition is an easy answer to both these criteria as it removes the financial barrier and it is especially beneficial to those who would not be able to afford it, while it deprives the richest of a privilege.

The Information Imbalance

Another rationale behind free higher education is the state's omniscient status. It is arguably true that the state has more information than citizens about all the benefits of
higher education; consequently, it is its role to encourage and support access and completion.

Higher education can indeed be defined as a merit good, which means that its benefits are not well recognised and acknowledged by the population. In the first account of what he called "merit wants," Musgrave (1959) defined them as goods that are so beneficial that they are financed by the state beyond what would be possible without government intervention. This means that the consumption of this good would not be high if the responsibility or choice to consume fell solely upon the citizen and the market, and that this good – due to its private and public positive returns and externalities – "merits" a better status. Education was one of the first clearly identified merit goods, health being another example. It is easy to extend this classification to higher education, not only because private benefits that cover the life span are hard to conceptualise for young adults, but also because of all the previously discussed public benefits and externalities.

The problem with goods that are deemed "merit" is that information asymmetries or bounded rationality may lead to poor choices. Head recognised that "distorted preferences constitute the essence of the merit good problem" (1966, p. 3). Imperfect knowledge can have two causes: uncertainty and irrationality. Both uncertainty and irrationality seem to have an important weight on distorted individual preferences when considering pursuing tertiary education. Uncertainty originates in incomplete, inaccessible, or misleading information; this is the case for higher education as citizens are seldom aware of the numerous benefits beyond financial well-being. Irrationality consists in making an erroneous choice even when having complete information.

52

Individuals choosing the workforce over higher education might be taking irrational decisions, as they do not appropriately account for future benefits and therefore take decisions based solely on the opportunity cost.

As the government is the one having all the information and behaving rationally, it needs to foster policies to encourage the consumption of merit goods – including higher education. With the inflation of higher education costs and the rise of cost-sharing (Johnstone & Marcucci, 2010), there is no question that higher education is a complicated investment decision for students and families. In the absence of complete information, families and students are tempted to postpone enrollment or simply not enter. This should be put in a context where the opportunity cost is high, as vocational degrees are usually 2-year long and bachelor degree 3 to 4 year long and students postpone getting a salary for as long as their degree takes. It is easier for citizens to see what they are missing than to acknowledge long-term benefits, especially those that are non-financial. On the other hand, the state has an extensive knowledge, based on years of research and practice, of the benefits of higher education, that are now recognised widely by international organisations. States are also expected to be more rational and wiser when it comes to long-term consequences and implications. Therefore, the state should be the one investing in higher education instead of citizens, with the aim of having the latter benefit from their education to an extent that they cannot acknowledge.

The Need for "Equal Opportunity"

Free tuition higher education is also often seen as one of the most effective policy to ensure equal opportunities. The theory of equal opportunities insists that every student

53

should have the same chances to enter higher education, independently of their socioeconomic background, race, religion, or other differentiating factors.

Coleman describes equality of opportunities in the field of education as a state "when the community provides the *same* resources, the same facilities, to all children" (1969, p. 347). He then goes on to argue that it equates the "idea that opportunity consist[s] of free and open access to the same school resources for all children" (Coleman, 1969, p. 348). Therefore, when Coleman discusses the idea of equal educational opportunities, he affirms that, to most, such equality is only possible if education is free for all. Abolishing the financial barrier to access education is a prerequisite for the achievement of "equal opportunities." Coleman goes on to a deeper analysis of equality of opportunities, as he recognised that the equal resources that students should have access to need to be efficient enough to erase the disparities creates by familial backgrounds. It could be argued that higher education is such a resource based on its economic and social positive impacts, as well as its potential to foster social mobility. Free higher education would therefore, in theory, guarantee equal access to all to a powerful and efficient educative instrument.

Similarly, in trying to understand the funding of higher education in Europe, Blaug and Woodhall (1978) remarked that rationales for free higher education are based on the belief that "it is necessary to provide free education at all levels and also to subsidise students' living expenses in post-secondary schooling so as to guarantee 'equality of educational opportunity'" (p. 352). It is therefore first and foremost acknowledged that the financial burden of higher education should not fall on the citizen because of the necessity to make it equally accessible to all. Since they favour the leasteconomically advantaged of our society and prevent higher education from being a privilege for those who can afford it, state subsidies are the guardian of equal opportunities. Tilak acknowledges that "the concern for equality of opportunity has led to almost universal agreement that the government should subsidise education" (2004, pp. 6–7).

Marxist theory is a good example of the use of free tuition to ensure equal opportunities. Marx and Engel (1848) supported free tuition education at all levels to ensure that individuals from all social classes were able to attend. Education was seen as an instrument for class emancipation, therefore a classless society could only be achieved if all had access to the same educational opportunities. By making sure that no educational opportunity could be considered dominant, the Marxists' objective was to build a fully egalitarian society. Marx also advocated the financing of education by the government as a way to ensure that education was not controlled by the ruling class and thus reinforcing class structures. Overall free tuition in the Marxist nation ensured equal opportunities to gain access to the same education and use this institution to build an egalitarian society.

However, most ideas about educational opportunities are not targeting a full equal society, but hoping for equity. While equality in education means giving each student access to the exact same resources, equity means giving each student what he needs to succeed. Recent studies about higher education support the fact that it is necessary to thrive in today's knowledge society. Therefore, a plan for equity through giving individuals equal educational opportunity needs to include support for accessing higher education. The abolishing of the financial barrier thanks to free tuition would reduce self-

selection of students from poor economic backgrounds, and ensure that they are given a decent opportunity of access.

Philosophical theories behind the rationales for free higher education are provoking: they touch upon such sensitive subjects as the public good, equality and equity. The debate about equality is especially important, at a time when a tertiary qualification becomes the norm in the knowledge society. As the cost of higher education rises in parallel with cost-sharing policies, tuition fees are seen as the main barrier to access, and free tuition as its logical solution. The public good rationale only reinforces the sentiment that higher education should be paid for by taxpayers' money, as the society is the main beneficiary of an educated population. The strength of the philosophical arguments behind free tuition explains why bastions of free-tuition higher education remain strong and why there is such general resistance to tuition fees. In fact, many of the free-tuition systems keep a political façade of free higher education, while most of their students end up paying fees for college education.

The Various Forms of Free Tuition Higher Education

Even though the countries mentioned before propose some type of free-tuition higher education, most fail to live up to the ideal of offering free access for all to public higher education. Faced with financing challenges, countries proposing free higher education have been consistently setting up cost-sharing mechanisms to alleviate the cost borne by the government. It enables them to keep the pretence of free-tuition, while generating revenues for their universities. Three cost-sharing systems have been implemented in countries that pride themselves on offering free public higher education: the establishment of nominal fees, the use of dual track systems, and the restriction of the number of public seats in public higher education institutions (Johnstone & Marcucci, 2010; Marcucci & Usher, 2012).

Nominal Fees

Nominal fees are fees charged independently of tuition to cover non-instructional university expenses. Some examples of these are registration or administrative fees that apply to all students. Other universities include fees for student health care, transportation on campus, and athletic programs (Marcucci & Usher, 2012). This system is widely used in Europe, to either keep higher education free – in principle and for tuition only – or to keep low levels of tuition (Marcucci & Usher, 2012).

The most striking example of the use of student fees, while remaining tuition-free, is Ireland. Euridyce (2013), a European project, found that Irish students pay a "student contribution" – formerly student service charge – of 2,500€ per year. The student contribution is supposed to pay for student services and examinations, and has increased from an original 190€ in 1997 to 3000€ in 2015-2016, thus helping cover funding issues due to the 2008 crisis without re-introducing contentious tuition fees (Citizens Information Board, 2016; Hazelkorn, 2014). This makes higher education in Ireland more expensive than some European countries acknowledging tuition fees, such as France or Italy (Euridyce, 2013). The case of Ireland is even more fascinating when one considers that Ireland abolished tuition fees in 1997, at that time equivalent to a little more than 2,000€ (Swail & Heller, 2004). In Ireland, the so-called "student contribution" is in all practical senses "the tuition fee 'that dare not speak its name'" (Hazelkorn, 2014, p. 1347).

Dual Track

Another scheme established by free higher education systems, especially former communist countries, is dual-track tuition fees. Public university programs in these systems have two tracks: one track charges no tuition fee to students while the second one charges tuition (Johnstone & Marcucci, 2010). The allocation to each track is merit based with high achieving students accessing the free track, while others are required to pay for the same education. This system is popular in Russia and former communist countries of Central and Eastern Europe. What characterises these countries is that they usually have free higher education as a constitutional right, and/or experienced strong popular and political resistance to the implementation of fees (Marcucci & Usher, 2012). The dual track system allows countries to maintain their investment in higher education, while not bearing the costs of increasing demand. The number of students accepted in the free track depends directly on the annual government budget (Johnstone & Marcucci, 2010), and is contingent on students' academic performance (Marcucci, Johnstone, & Ngolovoi, 2008). Since the early 2000s, East Africa – Uganda, Kenya, Tanzania – has also taken a special interest in the dual track tuition system, following the success of the concept at Makerere's University since 1992 (Marcucci et al., 2008). Other types of dual track tuition fees include continuing education programs, professional programs, and courses taught in a second language at free public universities, as well as making

international students pay tuition when national students do not (Marcucci & Usher, 2012).

The main example of the dual-track tuition fee system is Russia, where free higher education is guaranteed by the constitution (Johnstone & Marcucci, 2009). Financial difficulties in 1992 led to the implementation of the Law of Education—extended in 1996—that introduced cost-sharing and made the dual-track legal (Bain, 2001). By 2006, more than 50% of revenue generated by universities came from tuition fees (Johnstone & Marcucci, 2010). For many public universities, tuition is the second major income source after state allocations, rendering the Russian public system highly dependent on tuition fees. In fact, while in 1995-96 only 13% of students were paying fees, in 2005 over 55% of students in Russia paid for tertiary education (Johnstone & Marcucci, 2010). The dual track tuition concept has enabled Russia to absorb the increasing demand for higher education: the number of students tripled between 1992 and 2005 (Johnstone & Marcucci, 2010).

Privatisation

If in most countries in the world, the public system of higher education remains dominant, some countries have seen an important expansion of the private education system following the massification of higher education (Altbach, Reisberg, & Rumbley, 2010b). This private system is demand-driven and has become more important in terms of number of institutions and in enrollment share than the public system, especially in systems with free tuition (Levy, 2006). The explanation is simple: as demand rises, governments are not able to keep up with the costs and thus restricts the number of students in subsidised public higher education institutions, encouraging the establishment of private higher education institutions (Altbach, Reisberg, & Rumbley, 2010a). As a result, private institutions are a response for growing demand, and of the belief that education is a right and should be available to all, but these institutions are by no mean free.

Brazil is an interesting example of a free public system that is today overshadowed by a huge and expansive private system. Brazil has always had a wellfunded public system of higher education, but was not able to keep up with the massification of higher education. Between 1999 and 2005, the number of students in the higher education system tripled, thus forcing an expansion of the system (International Comparative Higher Education Finance and Accessibility Project, n.d.). This expansion was not led by the government, which did however support the establishment of an evergrowing private higher education system. As a result, the private sector absorbed most of the demand between 1998 and 2002 (Wiener, n.d.), while the elitist public sector remained small.

More recent figures from the 2013 higher education census in Brazil (Diretoria de Estatísticas Educacionais DEED, 2015) show that the trend has continued. Eighty-seven percent of higher education institutions are considered private, enrolling more than 5 million students, i.e. 74% of the total students enrolled in higher education. The private sector has become more and more important in Brazil, resulting in a vast majority of students who actually pay tuition in a country that refers to itself as tuition-free.

The situation of Brazil is well summarized in the following quote, that insists on the free access to an elite public system while most students access private institutions that charge tuition:

the public system has been kept small, relatively well-funded, academically selective, and for the most part socially elite, while a large, tuition-dependent private system of very diverse quality has been encouraged to absorb the rapidly growing demand for higher education. (International Comparative Higher Education Finance and Accessibility Project, n.d., p. 1)

This situation is not exclusive to Brazil: most Latin-American countries that fund public higher education have acknowledged a huge rise of their private sector with the expansion of access. In fact, the share of private enrollment in Latin America is around 49%, significantly higher than the second most private region in the world—Asia with 36% (Levy, 2006).

Full Free Tuition

Though many countries report or are considered free tuition, only a few really offer free tuition higher education to all their students with full access. Examples of such exceptions include the Nordic countries, in particular Finland and Norway, as Sweden and Denmark recently introduced tuition fees for international students thus creating a type of dual-track system (Vabø & Wiers-Jenssen, 2015). Other countries sustaining free tuition open access systems include Argentina and Cuba.

Typology

The above list of types of free-tuition systems is far from exhaustive. Every supposedly free country seems to have a somewhat very unique way of understanding the meaning and the extent of free tuition. The complexity of the landscape of free-tuition seems to have prevented any type of exhaustive listing of the different types of free tuition, as well as any clear and straightforward typologies to categorize them. The only existing typology was ventured by Alex Usher (2016) in a blog article and inventoried 9 types of free tuition systems. However, this typology only illustrates the complexity of free-tuition systems as it is not based on any explicit criteria coherent across types and is not providing any concrete order.

This work on free tuition has shown no promise in the exercise of finding a clear and concise typology to categorize these systems. However, certain criteria are important to understand the context in which such systems operate, including:

- Who the free system targets and the share of students benefitting from it:
 - Institutions: public only, some public, a subset of all institutions –
 public or private, all institutions public and private
 - Students: all students or some selected students, for all of their cursus or depending on performance.
- What is paid for:
 - o Tuition fees only
 - o Tuition fees and other fees
 - Tuition fees, other fees, and some or all room and board expenses
- When are tuition fees paid for:

- Non-deferred: tuition fees are never due by the individuals benefitting from free tuition
- Deferred: tuition fees are paid for by the government at the time of study and reimbursed via different mechanisms later on (including work requirements).
- Who covers the tuition fees:
 - The government (or the tax-payers)
 - A private organization

The landscape of free tuition higher education is therefore incredibly complex, and the definition of what free really means needs clarification for research purposes.

A Definition of Free

While the concept of free tuition higher education seems initially straightforward, in practice it is intricate. If researchers were to accept for sole definition of free-tuition higher education a system where any student can access some type of free public higher education, very few countries (if any) would actually be considered free.

For the purpose of this study, a wider definition need to be adopted to include all the countries considered above. These countries have in common that they consider themselves free and publicise their higher education systems as such. The following definition is therefore proposed: "a national system of higher education can be considered free-tuition when the mainstream track for domestic students in public higher education institutions has no tuition fees." As seen before, this definition encompasses a wide range of realities and students sometimes still have to pay high amount in those systems. However, it gives a basis for studying these countries where higher education seems to be free. By putting all these countries in a single category, it is possible to analyse their common characteristics as well as highlight their differences. This will help cast a light on these countries that are less studied as a category and in a comparative perspective than countries with high tuitions.

Conclusion

As higher education takes prominence in the knowledge society, issues concerning its financing are to widen, even more so as they are linked with other controversial issues such as access and quality. In the global discussion on tuition fees, countries offering free-tuition higher education seems to have been somewhat forgotten. This essay therefore sheds light on the commonalities and differences of this peculiar group of countries in the perspective of current financing trends.

Free-tuition systems are diverse geographically and in economic statuses, but all are anchored in strong philosophical and cultural traditions. Whether it is because they consider higher education to be a right or value equal opportunities, these societies are fiercely attached to free higher education. As a result, governments have had to set up different schemes to both protect free public higher education and provide some financial sustainability.

When Chilean or British students demonstrate calling for free higher education, they seem to forget to look at these real-world examples. Systems that offer free-tuition higher education are not exempt from issues of financing, access, and quality.

Theoretically, issues experienced by free systems can be seen through the lens of the "Iron Triangle." This framework introduced by Sir John Daniel highlights the three main issues facing higher education today—cost, access, and quality—and how they interact (Daniel, Kanwar, & Uvalić-Trumbić, 2009). This concept intrinsically acknowledges that an equilibrium is challenging to achieve, as trying to improve one of these aspects usually means altering another or both of the other pillars. Therefore, free-tuition higher education systems, which limit the cost side of the triangle, are deemed to face issues in access and quality. Though both issues are equally important and strongly related, the accent should be first put on access, as the simplest logic wants free tuition to mean full access. A lesson from the few examples developed in this chapter is that often free-tuition on the contrary signifies reduced access. Therefore, as free systems reduce the numbers of seats (through dual track or privatisation), students from high socioeconomic backgrounds are the ones who mostly get access.

On the one hand, research demonstrating systematic issues of access in freetuition systems would have the merit to deviate the focus from eliminating tuition altogether to considering innovating financing solutions aimed at equalizing access. On the other hand, if further research establishes that access is improved in tuition free systems, then it would give significant support to students and organizations and would incentivize governments to protect and increase public funds dedicated to higher education. In both cases, a research study looking at access in free-tuition systems in a comparative perspective would contribute significantly to the controversial issues of tuition and cost-sharing in higher education.

4. THE RELATIONSHIP BETWEEN TUITION FEES AND ACCESS

While this dissertation centers on the study of tuition policies – and more specifically of free-tuition policies, it chooses to do so by analyzing their effect on a specific issue: access. This chapter aims at giving a short insight of the academic literature around access and persistence, and more specifically at the studies that examine the relationship between access and financial considerations – including tuition fees.

Defining Access

There have been several attempts in the higher education literature to define the concept of access. A couple of these definitions are proposed thereafter. The first one insists on who can participate in higher education, by defining access as "the ability of people from various backgrounds to access higher education on a relatively equal basis" (Usher & Medow, 2010, p. 1). The second definition focuses on the opportunity by stating that:

the term access typically refers to the ways in which educational institutions and policies ensure—or at least strive to ensure—that students have equal and equitable opportunities to take full advantage of their education [...] When used in reference to education reforms, access typically refers to school strategies or policies designed to remove institutional disincentives, impediments, or barriers to academic success, whether intentional or unintentional, or to provide the resources, social services, and academic support that certain students may need to succeed in school (Abbott, 2014)

The third definition includes the concept of success by defining an access policy as a policy that aims both at the widening of participation in higher education to all sections of society, and at ensuring that this participation is effective (that is, in conditions which ensure that personal effort will lead to successful completion) (Council of Europe Committee of Ministers, 1998, p. 21)

These definitions help emphasize what is essential in the description of access to higher education. First, access goes beyond participation and encompasses the notion of completion or success. Thus, effective access in higher education ensures the participation of students up to the completion of their degree. Second, access is impossible to disentangle from the concept of equity in higher education. All the definitions above mention the diversity of student backgrounds and/or the need to remove barriers to access and help students that are less likely to participate. Equity has been defined for educational perspectives as relying on fairness, care, and transformation (Dowd & Bensimon, 2015). More specifically, this means that access cannot be defined without links to the concept of equity, and that all effort to improve access should strive to benefit the least advantaged and increase participation through non-oppression and nondiscrimination. This hints at the complexity of the seemingly simple concept of access to higher education.

However, the intricacy of access stems beyond the former definitions and the concept of success and equity, complexities that have yet to be enclosed in a single definition in the higher education literature. In this regard, the health care literature is more fertile and provides definitions of access that could serve the higher education field. Gulliford et al. (2002) state that access should not only mean having access – i.e. that

adequate services are available – but also being able to gain access – i.e. that there is no financial, organizational, social, and/or cultural barriers that limit the utilization of services. Likewise, Penchansky and Thomas (1981) define access in terms of availability, accessibility, accommodation, affordability, and acceptability. In both cases, authors recognize that access is a complex set of decisions by the consumer, which are based on both characteristics of the provider and of the consumer themselves, as well as the long-term fit between the two.

Access to higher education is a similarly intricate set of decisions made by the student that have been exposed in the literature. When it comes to financial policies, the student choice construct has been found to be the most appropriate theoretical framework (Paulsen & St. John, 2002), as it explicitly refers to access to higher education being a "sequence in educational choices with explicit policy linkages" (p.192). They quote six major educational decisions that a student has to make in anticipation of and during its tertiary studies (Paulsen & St. John, 2002). First in this sequence is the intent to participate in higher education, which Paulsen and St John refer to as the "formation of aspirations" (p.192). Second is the decision to attend, or opportunity. Third comes the college choice in which the student decides the type of higher education institutions they are interested in attending. Fourth is the choice of majors and of changing majors when relevant. Finally, the decision to persist to graduation has been increasingly included in the discussion over access, giving birth to the concept of "access and success." Another decision that could follow graduation is the choice to continue with graduate education, but that leads beyond the scope of this dissertation. Although, no model succeeded in

incorporating all of these choices, they have been at the heart of research on access and success in higher education (e.g. Chapman, 1981; Perna, 2006; Tinto, 1975).

Two more principles make up the student choice construct (Paulsen & St. John, 2002). First is the fact that different groups have different choice behaviors and should therefore be studied separately. The choices made by students in the different stages of their higher education life will depend on their gender, their financial means, or their age (Paulsen & St. John, 2002; Perna, 2006). Second, the context in which students make their choices is extremely important. This links back to the concept of habitus that has been explored widely in the access literature – including factors such as early schooling and familial environment (Paulsen & St. John, 2002; Perna, 2006).

This dissertation will use the student choice construct as a theoretical framework, and look at the relationship between tuition policies and three choices that are relevant to the study of access and success: the participation choice, the college choice, and the persistence choice. The remainder of this literature review will therefore focus on research that reported on the influence of tuition fees on these three choices. It is also important to note at the end of this section that this dissertation continues the tradition of giving a strong role to equity in its definition of access, through the study of students' socio-economic backgrounds.

How Students Make Choices?

Before analyzing the relationship between the tuition fees and these key student decisions, it is worth spending some time on examining the different theoretical frameworks existent to account for student choices at different stages of their higher

education cycle. Three such frameworks exist in the literature that have different viewpoints on the way student make choices: the economic framework, the sociological framework, and the information-processing framework (Cardak et al., 2015; Simões & Soares, 2010; Vrontis et al., 2007).

The economic framework assumes that prospective or current students are fully rational and have freedom of choice. Students make decision based on a cost-benefit analysis of the possible outcomes and seek to maximize utility in considering the various alternatives (Foskett & Hemsley-Brown, 2001; Hossler, Schmit, & Vesper, 1999; Perna, 2006). This approach is linked to the private rate of return and it assumes that students are aware of the return they will achieve for all possible alternatives. In this approach, changing tuition fee policies would make student reassess their choice (Cardak et al., 2015; Paulsen, 1998), therefore tuition fee policies have an impact on the choice assessment.

Sociological models or status attainment model emphasize the role of students' socioeconomic background and of students' characteristics on their choices (Perna, 2006; Somers, Cofer, & VanderPutten, 2002). The sociological approach is deterministic and predicts students' decisions based on demographics, socioeconomic factors, and academic achievement. It states that a student choice is a direct consequence of the environment in which they have lived and live. Of particular interest to researchers agreeing with the sociological framework are the concepts of cultural capital (Bourdieu, 1986) – knowledge and skills that are the results of the familial environment students were brought up in – and social capital (Perna, 2006) – the social networks and support structures the student can count on.

The information-processing framework is a combined approach that borrows from both the economic and sociological frameworks. Models using this framework analyze economic, cultural, and social determinants to student choices. It is interested in the different stages of the decision-making process for students and on the influences of factors listed above (e.g. Cabrera & La Nasa, 2000; Chapman, 1981; Hossler & Gallagher, 1987).

Most recently, in the spirit of adding more layers of complexity to the economic framework, attempts have been made to use behavioral economics to account for student choices (Diamond et al., 2012; Lavecchia, Liu, & Oreopoulos, 2014). Behavioral economics is not based on utility theory, as it recognizes that the assumption of rationality in traditional economics is flawed. In the case of higher education, students are making decisions under uncertainty as they do not have exhaustive information about the costs and benefits of the different options that is offered to them – should it be the options of participating or not to higher education, to choose a college over another, or to continue to graduation or stop their studies. Behavioral economics acknowledges that the errors made by human beings are systematic when confronted with complex choices and that it is best explained using psychological, social, or even neuro-biological factors (Diamond et al., 2012; Lavecchia et al., 2014). This blossoming area of economics is gathering increased attention in the study of student choices as it reconciles economics with sociological theories.

The information-processing and behavioral economics are probably the most promising frameworks when it comes to account for student choices, as they built in the complexity of the decision to make, the lack of information, and the influence of social and psychological factors. Students are faced with difficult and intricate decisions that have life-long consequences, and they certainly cannot be explained logically or using solely deterministic factors.

Tuition Fees and Participation in Higher Education

The literature is not short on studies about the impact of the net price of higher education on students. Early research by Leslie and Brinkman (1987) provided an integrative review of 25 student demand studies in the United States. All studies results were expected: an increase in price leads to a decrease in enrollment and vice versa, however the effects seem to be relatively modest. On average, they found that for each additional 100 dollars in tuition price, the participation rate of 18 to 24 year olds drops by 0.6 percentage points. A study published a decade later followed up on this meta-analysis and, adding the most recent data at the time, came to the same conclusion: a decrease in the probability to enroll when tuition fees rise (Heller, 1997). The data from the 1970s and 1980s confirmed a decrease in enrollment rate of 0.5 to 1 percentage points for an increase of 100 dollars across all type of institutions and students. Similarly small impacts were found in subsequent studies (e.g. Heller, 2001), further corroborating the fact that tuition fees have a modest negative effect on participation rates. Relatedly, recent studies have shown that increasing financial aid supports higher participation in higher education, while not sustaining financial aid leads to decreased participation (Dynarski, 2002; Dynarski & Scott-Clayton, 2013; Perna, 2010). Although most of the literature is on agreement on that relationship between tuition fees and participation,

some studies actually found counter-intuitive results with increases in tuition fees leading to increases in enrollment rates (Swail & Heller, 2004).

However, studies looking at particular student groups tend to paint a different picture of the tuition fees/participation relationship. In particular, greater tuition sensitivity has been observed among students from lower income groups (Heller, 1997; Kane, 1995; Leslie & Brinkman, 1987). With rising tuition fees, low-income students are more likely to not participate while high-income students' enrollment rate tends not to change. Similar differences are observed among ethnic groups, with African-American and Hispanic students being more sensitive to tuition increases (Heller, 1997, 2001). Analogously, students attending community colleges are much more sensitive to tuition fees increases than those in 4-year colleges (Heller, 1997). Similar results were found with regards to financial aid, as it was found essential for participation of underrepresented minorities (Perna, 2010). Analogously, students from lower socioeconomic strata have been found to be more adverse to debt and therefore are less likely to participate in contexts where loans are necessary to afford higher education (Callender & Jackson, 2005; Callender & Mason, in press). All these findings seem to relate to the SES backgrounds of students and ultimately show that students' economic background has an important influence on their probability to participate to higher education. Interestingly however, chances are that financial aid programs have bigger effect on the participation of more endowed students (Dynarski, 2000).

Few research studies exist outside of the United States that analyze the impact of tuition fees on participation (Swail & Heller, 2004). Studies in the Netherlands have found that tuition fees had very little impact on student demand for higher education

(Huijsman, Kloek, Kodde, & Ritzen, 1986; Oosterbeek & Webbink, 1995). A recent study in Jamaica showed that the establishment of cost-sharing did not alter enrollment growth, but it lacks specificity in terms of diversity (Nkrumah-Young, Huisman, & Powell, 2008). A further study on the introduction of tuition fees in Germany shows that the introduction of 1,000 euros tuition fees only decreased enrollment by 6.85 percentage point (Hübner, 2012). In the last couple of decades, attention has been focused on the United Kingdom and Australia, as they established new cost-sharing systems implicating an increase in the sticker price of higher education. In both cases, enrollment rates have continued to increase (Callender, 2006; Swail & Heller, 2004; Vossensteyn & Canton, 2001). A recent study of the British system surveyed high school seniors and showed that financial issues are dominant among factors influencing the participation decision, especially among students from lower socio-economic background (Wilkins, Shams, & Huisman, 2013). However, the cost of tuition was not the most influential financial factor: it is outdistanced by the cost of accommodation, the cost of living, the cost of travel, and the cost of repaying loans.

In line with the increased attention given to the information-processing framework and behavioral economics, it is interesting to note that some recent studies have not so much focused on the actual changes in tuition fees but on student's perception of the cost of higher education. In practice, studies show that students have a tendency to overestimate tuition fees (Coté, Skinkle, & Motte, 2008; Perna, 2006). Coté, Skinkle and Motte's study (2008) also shows that the perception of cost is not a significant predictor of participation to tertiary education.

Tuition Fees and College Choice

Hossler and Gallagher's model (1987) is a well-established reference in the literature looking at college choice. They stated that students face a three-step process to choose a higher education institution: predisposition, search, and actual choice. These three stages give an insight in the fact that both student- and institution-related factors are influential for college choice – and in the case of financial concerns, tuition fees and student socio-economic background are certainly of importance.

Several frameworks have been developed since the 1980s in regard to college choice (see for instance Cabrera & La Nasa, 2000; Chapman, 1981; Paulsen, 1990) that elaborates on the influences and factors that make students choose one institution over the other. In most of them, the socio-economic status of students does play a role, as well as the cost of education. Chapman (1981) refers to the latter directly under the fixed college characteristics that influence student choice, while Cabrera and La Nasa (2000) mention the perceived ability to pay as an essential part of the choice decision. In both cases, tuition fees are found to have leverage on college choice. More recent studies have corroborated the importance of tuition fees in student college choice (Dolinsky, 2010; MacAllum, Glover, Queen, & Riggs, 2007). Dolinsky (2010) in particular identifies tuition fees as one of the finance related attributes: he also identifies two more financial attributes, as well as many more academic and career-related attributes and college-life related attributes. However, tuition cost is found to be one of the most important factors to students, independently of genders, with scholarships and program of study. In all these frameworks, tuition fees and/or cost is always included among many other factors, therefore the relative importance of financial considerations is of interest.

Very similarly to the literature on higher education participation, the literature on college choice shows that high tuition makes a college less attractive to individual students (Paulsen, 1990; Perna, 2006; Perna & Titus, 2004). However, the higher education literature is far from agreeing on the extent to which the cost of attending college, and especially tuition fees, has an effect on college choice. Interestingly, retrospective studies – i.e. studies based on students already attending college – seem to rank cost as one of the most important factors (Briggs & Wilson, 2007; Eagan et al., 2016; Raposo & Alves, 2007), while studies with prospective students – high school students at the time of study – tend to give less importance to financial concerns (Byers González & DesJardins, 2002; Maryland State Higher Education Commission, 1999; Tennessee Higher Education Commission, 2008). Therefore the literature shows that tuition fees are not seen as a major obstacle in the choice of colleges students apply to – the search in Hossler's and Gallagher's model (1987) – but might be an essential element in the final choice of what college they attend – the actual choice.

The effect of high tuition is found to be particularly detrimental to the college choice of students from minorities and low socio-economic backgrounds. Perna (2006) proposes an integrated conceptual model of college choice that attempt to reconcile economic models drawing on human capital, sociological models focusing on habitus, human and cultural capital, as well as organizational considerations. It inscribes the student' assessment of the expected cost and benefits of college into 4 layers of contexts: the student's habitus, the school and community context, the higher education context, and finally the socio-economic and policy context. Students from low socio-economic background are therefore restricted in their college choice through tuition fees, as their

assessment of the high cost is not balances by such contexts as favorable habitus or a school and community context valuing tertiary education.

Corroborating Perna's model, the socio-economic background of future students is found to restrain both applications and enrollment (Shaw, Kobrin, Packman, & Schmidt, 2009). Cost has indeed been found to be one of the most researched information for all students, but more particularly for low-income ones (MacAllum et al., 2007). One important feature of the habitus of lower socio-economic students is their adversity to debt, which translates in students from the lowest social classes constraining their own college choice significantly to reduce the amount of debt (Callender & Jackson, 2008). Effectively, higher education cost limits greatly the college choice of students from lower socio-economic strata, as they tend to favor 2-year, public, or in state institutions, thus self-selecting out of more expensive but perhaps more prestigious options (Briggs & Wilson, 2007; Chapman, 1981; Shaw et al., 2009). Additionally, financial aid and funding opportunities have been found by many to have an effect on college choice (Dynarski & Scott-Clayton, 2013; Forsyth & Furlong, 2000). Cost of college attendance, and in particular tuition fees, therefore seem to have an effect earlier on in the college choice process for low-income students, who are more likely to restrain their choices from the search stage.

Tuition Fees and Attrition

The study of higher education persistence has taken significantly more importance in the past decades, as the limitation of increasing participation of disadvantaged populations came to light. Access and success has become the new moto of research on

77

access in the United States, thus highlighting the importance of persistence as a component of access. Although the literature revolves around the concept of persistence, this study focuses on the other side of the coin, attrition, because of data limitation. The term attrition is therefore favored thereafter.

The American literature about persistence revolves around two main theories: Tinto's model about integration and Austin's model about involvement. Tinto (1975) is probably still today the most influential model on persistence. It accounts for persistence and attrition through the lens of social and academic integration of students. This integration is facilitated by the student background, as appropriate cultural and academic background facilitate integration with peers. Astin's model (1984) resembles Tinto in that it bases persistence on non-academic factor. For Astin, student involvement is the key for them to graduate: this includes of course academic time but also and somewhat most importantly extra-curricular activities. Astin also found that parental education is an important factor of persistence, which ties back to the cultural capital evoked by Tinto.

Although Tinto and Astin are seen as foundational texts in America for the persistence literature, they have been contested over the past two decades mainly for failing to address the specific challenges of underrepresented students. In particular, Tierney (1992) critiqued Austin for only targeting traditional students, while Pascarella and Terenzini (1991) suggested adding race and gender to the model of persistence. More recent work highlights that Tinto's work has been empirically supported, but that it still needs revision to take into account new research on 2-year programs, but also to support more research on ethnic groups and different colleges (e.g. women's college) (Metz, 2004). Other propositions for revision include advocacy for adding the influence of

external communities, organizational theory of institutions, student psychology – including such factors as race and gender, and economic forces including financial aid (Braxton, 2000). Finally, from an international perspective, researchers have suggested economic and academic preparation should play a bigger role (Burkholder & Holland, 2014). However, most recent conceptual frameworks are still heavily based on the work of Tinto and Astin, and continue to exclude economic factors beyond the socio-economic status (Reason, 2009; Terenzini & Reason, 2005).

Tinto and Astin's foundational models show that the construct of study in this dissertation – tuition fees – might not be at the forefront of the analysis of student persistence, but it has been critiqued for excluding financial factors. The literature on student persistence provides mixed evidence of the importance of tuition fees in the decision to persist. On the one hand, some studies find that finances are correlated with drop out or are among the most important rationales behind the decision to drop out (Ishitani & Desjardins, 2002; J. Johnson, Rochkind, Ott, & DuPont, 2009; Ross et al., 2012). On the other hand, some recent studies have shown that financial matters have little influence on persistence, and usually rank low in the rationales for dropping out (Mueller, 2008; Raisman, 2013). It is important to note that studies looking at rationales for attrition have extensive limitations in their methodology, including access to students who dropped out, very low survey response rate, as well as the ambiguity and interconnectivity of rationales (Ascend Learning LLC, 2012).

A few studies have taken a look more specifically at the relationship between tuition policies, tuition levels, and tuition changes and persistence. Bruckmeier and Wigger (2014) used German data from the time when länders could set their own tuition

79

fees: they found no significant relationship between tuition fee policies and persistence. Similarly, a study looking across Canadian provinces found that tuition levels and tuitions changes create no significant difference in the persistence of students (Johnson, 2008). A longitudinal study in the U.S. also found that tuition increases have no impact on BA degree completion beyond the impact at enrollment (Turner, 2004), while another study showed different responses to rises in tuition fees based on social class – persistence among the poorest students being much more sensitive to increases in tuition fees (Paulsen & St. John, 2002).

While tuition policies seem not to relate to attrition from higher education, financial aid has been shown to have a significant relationship with persistence (Bettinger, 2004; Goldrick-Rab, Harris, Kelchen, & Benson, 2012). In particular, financial aid that is dependent on academic achievement is found to have a positive effect on completion (Dynarski & Scott-Clayton, 2013). On a related note, the socio-economic status of students is also of importance, as it affects directly many of the factors of importance to persistence, including educational aspirations, college choice, and academic preparation (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006). Therefore, the academic literature does report a link between financial considerations and attrition, although not one involving directly tuition fees policies.

Limitations

The literature on access and success in higher education tends to show that while financial concerns are important, the level of tuition fees has only a modest effect on the three decisions of interest in this dissertation: participation, college choice, and persistence to graduation. Among these, the choice of college seems to give the most weight to tuition fees, while it has very little influence on both other decisions. These observations are consistent with the decision of some countries to increase student fees substantially in the past decades.

However, the literature on access and success has several limitations, some of which have been highlighted throughout this chapter. Of particular interest to this dissertation is the overall lack of cross-country analysis that could reveal the importance of policy decisions and cultural environments. While the study of access is very American-centered, it must be acknowledged that the studies conducted in other national contexts have also mostly been limited to national contexts. This gap will be addressed in this dissertation through a comparison of participation to higher education, college choice, and persistence in three different countries.

5. COUNTRIES OF STUDY

This chapter takes a look at the set of countries that has been chosen for this dissertation. This study undertakes a few-country comparison (Lor, 2018), thus allowing the careful selection of appropriate countries. This chapter accounts for the choice of countries for this small-N study. It also includes detailed description of the national higher education systems of the three chosen countries, to provide adequate background to understand the methodology exposed in the next chapter and understand the limitations of the result interpretation, especially when it comes to generalization.

The Choice of Countries

The aim of this dissertation is to look at the relationship between tuition policies and different measurements of access and success in higher education. Of particular interest to this dissertation and to current debates taking place the world over is the political decision to provide higher education tuition free. The access to and success in higher education in such systems bears specific importance in the face of popular assumption that the absence of tuition improves access.

A Small-N Comparative Study

To answer the research questions, a quantitative comparative Study was designed with few countries as selected cases. This methodology has been found desirable for understanding complex relationships, and allows for high internal validity (Lor, 2018). However, the possibility to generalize are less important than in the case of large-N comparative studies, as the sample is restricted to a few countries.

The selection of countries for this dissertation follows the "Most Similar System Design" also known as Mill's Method of Difference (Lor, 2018; Mill, 1843; Otner, 2012). It implies the selection of countries that are very similar overall but different in one key characteristic: the variable of interest. Thus, it controls for many possible alternative explanations through the choice of overall similar countries, and it augments the chances that differences observed in outcome variables is due to the different characteristic. In the case of this dissertation, countries were carefully chosen to share many similarities, especially as far as their tertiary education system is concerned, but be different in their tuition fees policies, thus allowing the analysis of the impact of national tuition policies on different student decisions linked to access.

Specifically, three countries were chosen: two with free tuition public systems and one with high tuition fees, thus comparing between extremes. Choosing three countries instead of two was a conscious decision to try and replicate results internally, thus making sure that observed outcomes were not due solely to the specific choice of countries. Doing so also reduces the importance of the contexts in this comparative study. With a similar intention, the importance of the historical context was reduced by using two waves of the chosen surveys. Thus, data cover student decisions over more than 12 years (as it looks at all 18 to 24 years old surveyed in 2013 and 2011), the possible influence of historical shocks or events on the analysis was reduced.

The Choice of Countries and Timeframe

The first determinant in the choice of countries was to have at least one tuitionfree public system. As seen before in this dissertation, free-tuition systems are concentrated in some regions of the world – Europe, Latin America and Africa, limiting therefore the possibilities. European countries were eliminated as there is no lack of research on their systems and it would have been complicated to find a country with high tuition to compare to a free one (except for the UK, most of Europe still has very low tuition or high subsidies, which would complicate the comparison). There are also high internal differences inside Europe. African countries were also eliminated because of the very probable lack of data to use for analysis. They also have less developed public higher education systems, and often developed dual-track systems which would be more difficult to account for.

Latin America, on the other hand, was the most promising world region. First, higher education research is not as developed in Latin America as in other world regions, especially in regions harboring developed countries. More essentially, Latin America shelter many free public systems of higher education, but also has one exception with Chile charging some of the highest adjusted tuition fees in the world. While Latin America does not have the level of data you would find in Europe or North America, most countries regularly undertake socio-economic survey with education modules.

Concerning the exact chosen countries, Chile was an evidence for its tuition fees. It is also one of the most economically and politically stable country in Latin America and has been making efforts to improve its data collection – especially following its adhesion to OECD. As Chile is turning around and looking at implementing a free tuition for all policy, it is particularly interesting to compare access data from the pre-free area in Chile (i.e. pre-2016) to data in countries with free tuition and analyze whether this fares as a good idea in terms of access.

The second chosen country is Brazil. Brazil is attractive for its similarities to Chile in terms of economic growth. Beyond a free public system, it has a very controverted higher education system with heavy privatization due to the restriction of free seats in the public system. Brazil has some of best data in Latin America.

Finding a third country proved complicated. It had to be a Latin American country, to keep a reliable design with countries that share some culture and history. The choice of this third country was mostly driven by data availability: whether data was publicly available, consistent, and had similar information as the Chilean and Brazilian surveys. Argentina was chosen, a free-tuition country with open access to public institutions, therefore making this comparison about the "Southern Cone."

The remainder of this chapter proposes short descriptions of the higher education systems of these three countries, highlighting similarities and differences that will be essential to the interpretation of the results of this dissertation.

A Historical View of the Three Systems

In many regards, Brazil, Chile, and Argentina are very interesting systems of higher education to compare. Their geographic proximity is of course an advantage as it means that comparable forces have shattered their systems in similar ways over time. These three countries have been colonized by European countries—the Spanish for Chile and Argentina and the Portuguese for Brazil—and to some extent their higher education systems have been influenced by European ideas. In particular, in all three countries – as well as in most of Latin America – the Catholic church played a key role in setting up higher education and erecting the first institutions (Levy, 1986). In the 19th century however, it is the French Napoleonic model that became prominent in the Southern Cone and shaped the early Latin American institutions (de Wit, Jaramillo, Gacel-Ávila, & Knight, 2005). Although European colonization contributed to the shaping of the higher education systems, Latin American countries had to wait for their independence for their public systems to really take shape. In Chile, the University of Chile was the first public institution to open in 1842 (Bernasconi, 2014a; Cheng, Wang, & Liu, 2014). Similarly, Argentina opened national universities in the 19th century (Schwartzman, 2001) and most famously the University of Buenos Aires in 1821 (Garcia de Fanelli, 2014) while in Brazil the first institutions opened in 1808 but the first university only in the 1930s (Durham, 2004). These three systems therefore comprise young public systems that were shaped by similar influences early in their existence.

The Latin American higher education systems were also impacted strongly at the beginning of the century by the Cordoba movement that started in Argentina in 1918 and spread to the entire continent. This movement asked for the democratization and socialization of education, including free higher education and open admission (de Wit et al., 2005). This led throughout Latin America to the emergence of a new kind of university autonomy and governance, as well as the funding of institutions by the state (Schwartzman, 2001).

The expansion of higher education demand after the Second World War was met in Brazil by allowing the private sector to develop and absorb additional demand (Schwartzman, 1993, 2001). This is reflected in the highly-privatized systems in these countries today, reflecting the importance of private institutions in these countries to protect the right to higher education. Interestingly, this was not the case in every Latin American country, Argentina in particular responded by expanding its national public universities (Schwartzman, 1993).

The three countries of interest to this dissertation took different paths at the end of the 20th century, leading to the current shape of their systems. These systems will be described in further details in the rest of this chapter. Since the data used in this dissertation date back to 2011 and 2013, the systems are described close to that point in time and ignore some more recent policies – including the shift toward free tuition in Chile.

Description of the Current Chilean System

Under the dictatorship in Chile, Pinochet's government followed the ideas of the Chicago school and turned Chile into a market-driven society, including its higher education system (Bernasconi, 2014a; Cheng et al., 2014; Schwartzman, 2001). First, the higher education system was differentiated between universities, technical schools, and institute for professional education. Second, it was deregulated leading to an exponential growth in the number of institutions of all kind between 1980 and 1990. Third, and most importantly for this dissertation, the financing of higher education institutions was reshaped including the introduction of cost-sharing through high tuition fees. The 1981 reform movement led to the system as it is today.
An Overview

Higher education in Chile is divided between professional tertiary education and universities. Professional education happens in the 44 "professional institutes" and the 58 "technical training centers" (Consejo Nacional de Educación [CNED], 2015). While the former provide education in applied professional fields, the latter offer two-year long vocational programs (Bernasconi, 2014a). These institutions are all private. Together, these institutions welcome more than 510,000 students, that is 44 percent of the Chilean student body (CNED, 2015).

Chile comprises a total of 60 universities, 16 are state universities while the 44 remaining ones are private (CNED, 2015). However, of greater importance to the study of the Chilean case is the difference between universities belonging to the Rector's Council (Consejo de Rectores – CRUCH). The 16 state universities belong to the CRUCH as well as 9 private ones – also called traditional universities as they were created before 1980. These 25 universities all receive funding from the state, while the 35 non-CRUCH private universities do not (Bernasconi, 2014). The universities overall welcome 642,000 students – i.e. 56 percent of the Chilean student body, and CRUCH universities admit 303,000 students – i.e. 26 percent of the student body. Overall, taking into account all kinds of higher education institutions, 85 percent of Chilean students attend the private sector (CNED, 2015).

:	89
---	----

Table 5.1. Institutions and enrollment in Chile

	Professional institutes	Technical training centers	Universities	Total
Number of institutions	44	58	60	162
Enrollment Source: in text	368,981	141,071	642,073	1,152,125

The Chilean system has undergone massification in the past couple decades, with a steep increase of the net number of students entering higher education. Between 2005 and 2015, the number of students in higher education has nearly doubled (CNED, 2015). These additional students have mainly been absorbed by the professional institutes, who went from admitting 19 percent of the students in 2005 to 32 percent in 2015 (CNED, 2015). State universities at the same time have continued to admit the same number of students as in 2005, thus decreasing their enrollment share from 26 percent to 15 percent (CNED, 2015). In 2013, 83.8 percent of the 5-year age-group following on from secondary school leaving was participating in tertiary education (UNESCO Institute for Statistics, 2013), one of the highest gross enrollment ratio in Latin America.

Transition to Higher Education

The PSU (Prueba de Seleccion Universitaria) is the standardized entry exam for universities since 2003 (Universidad de Chile, 2009). It includes two mandatory subjects (Spanish and communication, and mathematics) and two electives. The questions are graded on a total of 850 points. All the publicly funded (CRUCH) universities, the best ones in the country, and some private universities use the results of the PSU as a critical part – if not the only - of the admission process (Departamento de Evaluacion, Medicion y Registro Educacional [DEMRE], n.d.). Subsequently, in the access to higher education, K-12 education is essential as it prepares for the PSU. Students from private or semi-private schools outperform students from public schools on the PSU: in 2015, 77 percent of the students from private schools who sat the PSU ultimately got into a university, while only 39 percent of students from semi-private schools did so and a meager 29 percent students from public schools achieved similar results (DEMRE, 2015). These statistics also do not account for selfselection and the students who decide not to take the PSU. Access to the best universities is therefore highly restricted in Chile, both in terms of the number of available seats and the merit-based selection process. It is therefore undeniable that K-12 education has a strong influence on higher education in Chile.

Higher Education Funding

The Chilean government spends 0.83 percent of GDP on tertiary institutions (UNESCO Institute for Statistics, 2013), a little shy from the OECD average of 1.1 percent (Organisation for Economic Co-operation and Development, 2016). In 2013, it was spending nearly 3,817 constant PPP dollars per student, that is 18 percent of the GDP per capita (UNESCO Institute for Statistics, 2013).

As mentioned before, the funding of higher education in Chile was redesigned in 1981, when government support was deeply cut and institutions were encouraged to selfsustain through tuition fees (Bernasconi, 2014). CRUCH universities receive a block grant to cover instructional costs, that is based mostly on historic criteria (Garcia de Fanelli, 2008). Public and private institutions all receive an indirect public subsidy, that is based on input performance (Garcia de Fanelli, 2008). To help students finance their own higher education fees, a system of loans was introduced at the same time. Private universities established after the 1981 reform were not eligible to receive any government funding and their students initially could not take up subsidized public loans. The later was changed in 2006, with the opening of loans and some grants to students at private universities (Bernasconi, 2014a).

Research in Chile is funded through an organization called FONDECYT (Fondo Nacional de Desarrollo Científico y Technoloógico) established in 1981, which awards funding to researchers based on a peer-review process of projects (Ministerio de Educacion, 2010). The process was first restricted to researchers at CRUCH institutions, but since 2006 it is also open to researchers in new private universities (Bernasconi, 2014a).

These funding policies led to Chile becoming highly reliant on tuition fees in a region where most countries provide free public higher education. Chile's current level of tuition fees are the second highest in the world when adjusted per GDP, second only to American private universities (André, 2012). The marketization of the system and the high financial burden has been at the heart of massive student demonstrations in 2012 that led to the current effort to make Chilean higher education free.

Description of the Current Brazilian System

In Brazil, educational reforms implemented by the military government focused on increasing graduate education and research, as well as deregulating a low-quality entrepreneurial private system. Its primary aim was to increase the role of Brazil on the world's stage through the improvement of its military, economy, and technology (Schwartzman, 2001). Additionally, the dictatorship significantly reshaped higher education on the American model – introducing departments, credits, limiting faculty autonomy etc. (Durham, 2004). But curricular reforms failed to be introduced, as the system remained organized around careers, thus limiting the Americanization of Brazilian higher education. Of importance to this dissertation is the fact that public higher education remained tuition free.

As the military government ended, the Brazilian new government drafted the 1988 constitution that included the right to education and allowed public support for some type of private schools and institutions that help sustain the right to education (Stocco Ranieri, 2010). It was soon followed by the passing of the National Education Guidelines and Framework Law in 1996 that is the basis of the current organization of Brazilian higher education (International Bureau of Education, 2012). It notably introduced vocational education.

An Overview

Higher education in Brazil has a small number of public research universities (federal, state, and municipal ones) and a vast number of private ones, usually of lower quality (Knobel, 2014). In 2013, Brazil comprised 2,090 private institutions and only 301 public institutions. These institutions are separated between 195 research universities, 140 university centers (several schools together with a focus on teaching), 2,016 faculties (similar to colleges in the United States), and 40 vocational entities (Diretoria de Estatísticas Educacionais DEED, 2015). Although research universities comprise only 8.2 percent of the total number of higher education institutions in Brazil, they admit 53.4 percent of the student body. The more than 2,000 faculties on the other hand – a share of 84.3 percent of the higher education institutions – admit only 29.2 percent of the students. The university centers welcome 15.8 percent and the vocational institutions admit a small 1.6 percent (Diretoria de Estatísticas Educacionais DEED, 2015). In terms of private/public sector divide, in 2013, the private sector accommodated 74 percent of the student body, while the public sector only catered for 26 percent.

Table 5.2.	Institutions and enrollment in Brazil						
	Research universities	University centers	Faculties	Vocational education	Total	Private sector	Public sector
Number of institutions	195	140	2,016	40	2,391	2,090	301
Enrollment	3,898,880	1,154,863	2,131,827	120,407	7,305,977	5,373,450	1,932,527
Source. In tex							

The Brazilian system has undergone heavy massification in the past decades. Between 2003 and 2013, the number of students increased by 86 percent, from nearly 4 million to 7.3 million (Diretoria de Estatísticas Educacionais DEED, 2015). The bulk of the massification was absorbed by the private sector: 2.6 million additional students were admitted by institutions in the private sector, a growth of 94 percent, while the public sector only accommodated 750,000 students (Diretoria de Estatísticas Educacionais DEED, 2015). In terms of institutions type, university centers saw the biggest increase in students – with a 229 percent growth over 20 years (Diretoria de Estatísticas Educacionais DEED, 2015). The rest of the growth was absorbed in faculties and vocational institutions. Although the later institutions only admitted 120,000 students in 2013, this number doubled from 2003 (Diretoria de Estatísticas Educacionais DEED, 2015). Research universities experienced the smallest growth.

93

Transition to Higher Education

In Brazil, entry exams called *vestibulares*, that were custom-made by each institutions, are being replaced or complemented by the ENEM (Exame Nacional do Ensino Medio) since 2009 (Wildavsky, 2010). The ENEM's original purpose was to evaluate the quality of secondary education, but its purpose was shifted by institutions that now use it as a screening instrument (Knobel, 2015). Though supposed to be voluntary, the ENEM is nowadays used by free public universities in their admission process as well as other universities, and also for the award of some scholarships (Travitzki, Calero, & Boto, 2014). As a result, 8 million students enrolled in 2015 to compete for 250,000 seats at public universities (Knobel, 2015). This exam is a standardized test with 180 multiple choice questions on the high school curriculum that are graded on a total of a 1000 points.

Like the Chilean PSU, the ENEM creates inequity between students coming from different backgrounds. More precisely, students from the private sector score higher on the ENEM than the ones from public schools – except for federal schools (Schwartzman, 2015). In 2014, only 93 public schools made it into the top 1000 schools ranked by average scores on the ENEM (Moreno, Tenente, & Luiz, 2015). Most of these public schools come from the richest provinces of Brazil. This creates an evident gap between socio-economic classes and a geographic disparity in terms of opportunities to access public higher education. Although quotas are set up for students from ethnically or economically disadvantaged backgrounds, the ENEM allows the public sector to remain very elitist (Knobel, 2015).

Higher Education Funding

The Brazilian government spends 0.82 percent of GDP on tertiary institutions (UNESCO Institute for Statistics, 2012), very similar to what Chile spends. In 2012, it was spending 4,118 constant PPP dollars per student, that is 27 percent of the GDP per capita (UNESCO Institute for Statistics, 2012).

The Brazilian government pays directly for the education of all students in the public higher education system. The resources for recurrent and capital costs (non-personnel related) are awarded on the base of performance funding, including indicators such as the decrease of dropout and the quality of postgraduate programs (Garcia de Fanelli, 2008). It also established in 2005 a policy called ProUni that incentivizes private higher education institutions to create scholarships, whose value is exchanged for tax exemptions. Brazil also has a loan program called FIES with a low interest rate (de Melo Costa, 2014; Garcia, 2012).

Research is funded through different developmental systems and institutions, most of which are affiliated to ministries. For institutions, a key player is the National Scientific and Technological Development Fund (DAAD, 2016).

Overall higher education financing in Brazil is very dependent on the economic health of the country – as the government regulates the number of seats freely available in the public system and proposes financial help for disadvantaged students going to private institutions. However, the current poor economic situation begs the question of the future of higher education, as a recessing economy could both impede the capacity of the government to finance public higher education and research, as well as the capacity of families to pay for private higher education (Schwartzman, 1991).

Description of the Current Argentinian System

In Argentina, the authoritarian regimes that started in 1930 with Uriburu's coup did not reform higher education in significant ways, except for expelling dissidents, shutting some departments, and forcing the choice of new administrators on universities (Schwartzman, 2001). In 1984, Argentina became a democracy again and efforts were engaged to return the University of Buenos Aires to what it was prior to the dictatorship (Schwartzman, 2001).

The current higher education system in Argentina is the result of a law that was passed in 1995. Of particular importance to characterize the Argentinian higher education system is the autonomy of higher education institutions and the free-tuition policy in public institutions (J. F. Martin & Montero, 2013).

An Overview

The Argentinian higher education system is composed of 50 public universities and 50 private universities as well as 7 public and 13 private institutes – i.e. institutions that focus on one field (Secretaría de Políticas Universitarias, 2013). While this seems balanced in terms of the number of institutions, there is a high disequilibrium between enrollment in the public and the private sector. The public universities and institutes admits 79 percent of the undergraduate student body going to these types of institutions, while the private sector admits only 21 percent (Secretaría de Políticas Universitarias, 2013). This is in part due to the policy stating that all students graduating from high schools are entitled to attend a public university, i.e. to enroll into higher education without paying tuition fees (Garcia de Fanelli, 2014). The Argentinian system also includes some 2,500 vocational public and private institutions that offer teacher training and short vocational programs and that enroll more than 800,000 students (Garcia de Fanelli, 2014; Instituto Nacional de Estadística y Censos, 2015).

Tuble 5.5. Institutions and enforment in Argentina								
	Public			Private				
	Universities	Institutes	Vocational	Universities	Institutes	Vocational		
Number of	50	7		50	13			
institutions	50	,		50	15			
Undergraduate enrollment Source: In text	1,437,	,611	551,428	393,1	32	302,425		

Table 5.3. Institutions and enrollment in Argentina

Argentinian higher education experienced massification earlier than other Latin American systems (Garcia de Fanelli, 2014), most probably because of its open policy for admission in a free public system. As a result, the growth in the number of students in the past decade is small when compared to Brazil and Chile. Overall, between 2003 and 2013, 340,000 more students were enrolled in universities and institutes, a growth rate of 23 percent (Secretaría de Políticas Universitarias, 2013). The net number of additional students was evenly distributed between the public and the private sector (respectively 164,000 students and 178,000 students), but this represented a growth rate in enrollment of 83 percent for the private sector and only 13 percent in the public sector (Secretaría de Políticas Universitarias, 2013). This is very likely due to the capacity of private nonuniversity institution to provide short-term technical courses directly geared to the labor market needs (Villanueva, 2007). Indicators thus show that currently the small increase in demand in Argentina is absorbed by a strengthening private sector, although the public sector is still highly dominant. In 2013, 80 percent of the 5-year age-group following on from secondary school leaving age was participating in tertiary education (UNESCO Institute for Statistics, 2013), one of the highest gross enrollment ratio in Latin America, that is very similar to Chile's. However, this achievement of the Argentinian higher education system is limited by the high drop-out rate of unprepared students in their first year of studies (Garcia de Fanelli, 2014).

Transition to Higher Education

As said previously, the system in Argentina guarantees admission in a public institution for every graduating high school student. The only requirement is to have completed high school (Gonzalez Rozada & Menendez, 2002).

In the private sector, admission policies vary based on the institution – from open admissions to very selective ones based on test scores and interviews (Gonzalez Rozada & Menendez, 2002).

Higher Education Funding

The Argentinian government spends 0.96 percent of GDP on tertiary institutions (UNESCO Institute for Statistics, 2011), very similar to what Chile and Brazil spend. In 2013, it was spending 16 percent of it GDP per capita per tertiary student (UNESCO Institute for Statistics, 2013).

The Argentinian government provides the budget for the education of students in the public higher education system. Universities budget is a combination of block grants and a negotiated pay scale. Argentinian institution also recourse to postgraduate tuition fees, consultancy, and technical service to complement the public subsidies (Garcia de Fanelli, 2008).

Research funds are allocated by the government to public institutions based on a formula that includes the number of faculty that take on both research and teaching. Competitive grants are also available (Garcia de Fanelli, 2008).

Conclusion

The comparative study in this dissertation will therefore comprise three countries that have historically been shaped by similar historical forces and that retains similarities nowadays while exhibiting key differences.

All three countries have undergone somewhat recent massification, with Argentina and Chile having similar gross enrollment ratio today. Brazil has a lower enrollment ratio, which can be easily explained by the sheer size of its system (Table 5.4). All three countries have developed differentiated systems, with the introduction of vocational education. Brazil is the country with the least developed vocational sector today. Chile and Argentina seem to have more mature systems of higher education.

While Brazil and Chile are mostly private systems, with a small share of students attending state or subsidized institutions, Argentina is predominantly public and its private system seems to be just taking off.

All three countries have similar spending on tertiary institutions in terms of percentages of GDP, although Brazil is definitely the country spending the most net cost per student.

Finally, and of particular interest to this dissertation are the tuition and related access policies for each country. Chile's public universities charge high tuition and are very little subsidized by the government. Aid comes to students in the form of grants and loans. Brazil and Argentina both have tuition-free public systems, but while Argentina is open access, Brazil restricts the access to its public institutions on a merit base and provides aid for students going in the private sector.

Based on this initial overview of each system, I believe that the little-N comparative analysis proposed in this dissertation will generate interesting results and provide a needed insight into free public higher education systems.

	Argentina	Brazil	Chile
Access			
Gross enrollment ratio (2013)	80	46	84
Merit-based entry exam	No	Yes	Yes
% Enrollment in vocational sector (2013)	31	2	42
% Enrollment in private sector (2013)	26	74	(2015) 85 (2015)
Financing			
Governmental expenditures on tertiary	1.0	0.8	0.8
institutions as a % of GDP	(2011)	(2012)	(2013)
Government expenditure per tertiary	16.2	26.6	17.5
student as a % of GDP per capita (2013)		(2012)	
Tuition fees in the public system (2013)	No	No	High
Source: In-text			-

Table 5.4. Summary of key statistics for the three systems.

6. RESEARCH DESIGN

This chapter introduces the research design for the study undertaken in this dissertation with the three countries chosen before. It provides comprehensive details on the data sources, as well as the steps taken in preparing the data for analysis. It also explains the methodology that is subsequently used to answer the three research questions.

Data Description

Data Sources

The three data sources used in this dissertation are made publicly available by the governments of each country. They consist of socio-economic surveys that are undertaken with a representative sample of households in the country and comprise many modules, including income and work, education, and health. The surveys of Brazil and Argentina are similar in their education modules and include comparable questions, while the Chilean survey is more comprehensive but includes the basic information that is found in both other countries' surveys. Using socio-economic surveys has many advantages, including the facts that the sample is nationally representative by design, that it is an exercise undertaken by many countries, that the primary aim of these surveys is to estimate the poverty level of a country and thus income data are highly reliable, and finally that they are often publicly available.

For Chile, data from the 2011 and 2013 Encuesta de Caracterización SocioEconómica Nacional (CASEN) is used. Initiated in 1985, CASEN is a biannual or triennial survey that provides rich information on the Chilean people's demographics, education, wealth and health. This survey is carried out by the Ministerio de Desarrollo Social (Ministry of Social Development) and uses multistage stratified random sampling to generate a nationally representative sample of the population by region in both rural and urban Chile (Ministerio de Desarollo Social, 2015).

For Brazil, data from the 2011 and 2013 National Household Sample Survey (PNAD) is used. This survey has been undertaken for more than 40 years and is now a yearly exercise. It provides information on population characteristics, education, migration, labor, and income among others. This survey is carried out by the Brazilian Institute of Geography and Statistics (IBGE). It uses a three stage sampling design: first selecting municipalities stratified by the number of inhabitants, then enumeration districts, and finally households (Damico, 2013; Nascimento, Mambrini, de Oliveira, Giacomin, & Peixoto, 2015).

For Argentina, data from the 2011 and 2013 Permanent Household Survey (EPH) is used. The Argentinian socio-economic survey started in 1974. It is undertaken continuously with 4 annual estimations. It is carried out by the National Statistical System (Sistema Estadístico Nacional). The sample design of the Argentinian survey is complex, starting with an estimation domain of all agglomerations above 100,000 inhabitants. This means that EPH is not undertaken in rural areas in Argentina. This survey uses a probabilistic sample of areas: this includes a two-step stratified sampling – first for enumeration districts within agglomerations and second for households inside these units (Comari & Hoszowski, 2013). Accuracy of data can be assessed in parts through the nonresponse rate that indicate whether the data is representative and whether there is bias. The CASEN data response rates are given in technical documents and are estimated at 20.3% and 20.7% of households in 2011 and 2013 respectively. Brazilian non-response rates were calculated using the household databases: they amount to 23.4% and 21.6% in 2011 and 2013 respectively. However, excluding vacant households and demolished units, as is advised by the United Nations (Statistics Division of the Department of Economic and Social Affairs, 2005), the nonresponse rates decrease to 10.4% in 2011 and 6.0% in 2013. For Argentina unfortunately, non-response rates are neither available in technical documents nor is it possible to calculate them. Latest nonresponse rates were available for the 2004 to 2006 waves, and were estimated between 10% and 15%. Therefore, response rates seem quite reasonable overall and hint at data quality, although caution should be used with Chile whose nonresponse rates are quite higher.

Samples

The samples provided by the three chosen surveys exceeds the needs for this dissertation. Therefore, subsamples were designed to select individuals of interest for the different parts of this study.

First and foremost, this study focuses on college-aged students and therefore samples were restricted to individuals between 18 and 24 years old. Additionally, as the construct of interest is first and foremost college access, anyone not eligible for college was excluded: this means retaining only individuals who have completed secondary education. Second, the socio-economic background of college-age individuals, which was measured using two proxies– family income and parental education – is essential to the analyses. The three socio-economic surveys are administered to households and therefore it is possible to access such information if a college-age individual is living with family. However, for college-aged individuals living on their own, data is limited to their own income and their own educational attainment (except in the Chilean survey, where the question of parental education is asked to the couple heading the household). Therefore, samples were limited for the three countries to individuals living in a household they do not head and where they have a family link with the couple heading the household. As seen in Table 6.1 below, this was not a major issue in the samples for this study since for all three countries, more than three quarters of the college-aged individuals who finished high-school are retained.

Table 6.1. Changes in samples' sizes with sampling decisions for the participation sample Chile Argentina Brazil **Original sample** 418,793 453,887 721,473 18-24 year olds 52,804 57,344 83,510 38.797 33.307 46.115 **Finished high school** Living with parents 34,963 (90%) 26,657 (80%) 35,403 (77%)

For the model of college choice, the sample consisted of individuals who participate or participated in higher education. Individuals who finished their undergraduate degrees were excluded because of a lack of data on the type of higher education institution they attended. This concerns individuals currently working as well as those currently in postgraduate degrees. Table 6.2 shows the final sizes of the samples for the college choice model for all three countries.

1	Chile	Argentina	Brazil
Participation sample	34,963	26,657	35,403
Participate(d)	19,478	17,154	14,591
Current undergraduates	16,222	15,072	11,274

Table 6.2. Changes in samples' sizes with sampling decisions for the college choice sample

The analysis of college attrition used the same sample as the participation model. Additionally, those with postgraduate education were excluded since the available information relate to their postgraduate experience, not their undergraduate one. The data limitation for this model mainly came from the Argentinian and Brazilian surveys which do not include a question about the length of degree for those who have graduated. Therefore, a time variable is only available for those who are currently attending higher education and those who have dropped out, which leads to left truncated data, that must be acknowledged as a limitation. Table 6.3 shows the final sizes of the samples for the attrition model for all three countries.

Table 6.3. Changes in samples' sizes with sampling decisions for the attrition sample

	Chile	Argentina	Brazil
Participation sample	34,963	26,657	35,403
Undergraduate only	19,447	17,133	14,447
Did not graduate	17,192	16,018	12,311

Variables

Outcome variables

Participation. The participation outcome is a binary variable indicating whether an individual participates or participated in undergraduate education at any stage of their life – i.e. whether this individual entered higher education without regard to completion. Table 6.4 presents the descriptive statistics for participation in each country. Argentina has the highest participation rate, with 64 percent of individuals in this sample who entered higher education, while Brazil has the lowest participation with only 41 percent of the sampled individuals who attended a higher education institution.

Table 6.4. Descriptive statistics for participation

	Chile	Argentina	Brazil			
Participation	15,485 (44%)	17,154 (64%)	14,591 (41%)			
No participation	19,478 (56%)	9,503 (36%)	20,812 (59%)			
Missing	0	0	0			
Note: This outcome refers to the sample previously presented in Table 6.1.						

College choice. The college choice outcome is a binary variable that indicates whether a participating individual makes the choice of public or private higher education. Further differentiation in the variable is not possible, especially in terms of vocational or technical education, as the Argentinian and Brazilian surveys do not include such levels of details. This limits the college choice analysis, since underrepresented populations tend to favor technical and vocational institutions (Briggs & Wilson, 2007; Shaw et al., 2009), and contexts are all the more important in the interpretation of college choice results. Table 6.5 presents the descriptive statistics for each country and confirm knowledge of the different higher education system, with Argentina being a mostly public system – with 80 percent of the students in the sample attending or having attended a public institution – while Brazil and Chile both have a smaller proportion of students in their public system, respectively 30 and 36 percent of the samples.

<i>Tuble 0.5.</i> Descriptive statistics for conege choice							
	Chile	Argentina	Brazil				
Public	5,848 (36%)	12,026 (80%)	3,358 (30%)				
Private	10,326 (64%)	3,033 (20%)	7,916 (70%)				
Missing	48 (0%)	13 (0%)	0				

Table 6.5. Descriptive statistics for college choice

Note: This outcome refers to the sample previously presented in Table 6.2.

In the case of Argentina, the data collected distinguishes only between private and public. Similarly, the Brazilian survey includes a question about the type, public or private, of institutions attended for those currently pursuing their studies. Finally, the case of Chile is unique since public higher education refers to institutions affiliated to the CRUCH, i.e. institutions that are at least in part funded by the state. Additionally, the Chilean data differentiates between professional and technical education: since all institutions providing professional and technical education at the tertiary level are private, they are coded accordingly.

Outcome variables for the survival analysis. To develop the survival analysis for attrition two indicators were created that compose the dependent variable: (1) a time component based on the number of completed years of higher education, and (2) an indicator of whether the student dropped out or are still studying. In all countries, survey participants are asked whether they have completed the highest level of studies they attended. As mentioned earlier, the sample was limited to individuals who did not graduated: these individuals can be differentiated between the current students – still at risk of attrition but censored at the time of survey – and the drop-out students – not currently studying and who did not complete higher education. Table 6.6 shows that the

ratio of drop-outs in the sample is quite low, with only 6 percent of students indicating they did not graduate in Argentina, and 8 percent in Brazil and Chile.

Table 6.6. Descriptive statistics for attrition, by country Chile Argentina Brazil 15,891 (92%) 15,064 (94%) 11,274 (92%) **Students** 1,296 (8%) 945 (6%) 1,037 (8%) **Drop-out** 9 (0%) 0 Missing 5 (0%)

Note: This outcome refers to the sample previously presented in Table 6.3.

The time variable consisted of the number of years of study completed. For Argentina, the survey includes a question to all respondents about the last year of schooling they completed. For Brazil, this information is available through three different questions. Current students answer a question about the current academic year they are in. Drop-out students first indicate whether they completed at least one year of study and, if so, then the last year they actually completed. Similarly, the Chilean survey distinguishes between current and former students in a single question. Current students are asked to indicate the current year they are in and former students the last year they completed. For current students, the time variable is adjusted to code for completed years by subtracting 1. For former students, the codebook does not allow for a zero option, indicating non-completion of the first year. Based on drop out values, I made the choice to subtract 1 for these individuals too, i.e. understanding that they indicated the last year they attended. Descriptive statistics are presented in Table 6.7. Chile seems to have a higher proportion of drop-outs in the first two years, but more chances of completion afterwards, than the two other countries. The net number of drop-outs in Argentina and

Brazil is quite stable across the three first years, indicating rising probabilities of dropouts in year 2 and 3.

	Chile		Arge	Argentina		Brazil	
	Current students	Drop out	Current students	Drop out	Current students	Drop out	
1	16,628	541	15,644	264	12,015	296	
2	11,255	458	10,592	274	8,411	274	
3	6,413	190	6,412	256	5,012	266	
4	3,040	70	3,029	108	2,524	115	
5	1,026	33	1,119	28	715	66	
6	98	4	203	4	140	20	
7	6	0	26	0			
8			8	1			
9			4	0			
10			4	0			
Missing	23 (0%)	110 (0	0.7%)	C)	

Table 6.7. Descriptive statistics for the academic years, by student status and by country **Chile Argentina Brazil**

For all three countries, these represent quite low levels of attrition compared to what is found in the literature. This is in large parts due to the choice to look solely at the generation of 18 to 24 year olds. This timeframe prevents to fully acknowledge the extent of attrition, as it focuses on young individuals who might not have had time to drop-out yet. This is taken into account in the survival analysis. Also, this model fails to include students who might stay on beyond 24 years old and drop-out later on, a phenomenon that is not uncommon, notably in Argentina (de Wit et al., 2005).

Finally, a look at the original datasets shows that for all three countries, the ratio of completed higher education degrees versus uncompleted ones is quite high compared to what the literature proposes. In the datasets, 19 percent of all the individuals who started higher education indicated they dropped out in Chile, 29 percent in Argentina and 13 percent in Brazil. Recent studies show that currently, out of a 100 students, 40 do not graduate in Chile, 69 in Argentina, and 49 in Brazil (Centro de Estudios de la Educacion Argentina, Universidad de Belgrano, 2015). The gap between the data analyzed here and the reality is probably due to the sampling design of the three surveys, with individuals in rural areas being less represented. This would particularly explain the gap in Argentina, as EPH only surveys large agglomerations. This could also be due to a lack of data quality in the surveys and the reluctance of individuals to state that they did not complete their study. Changes in the Chilean survey between 2011 and 2013, where the location of the completion question was changed, also indicate possible confusion over the question and what it refers to.

Predictor variables

This analysis aims at exploring the importance of individual socio-economic status in contexts with different tuition fee policies. In conformity with debates about representing the socio-economic background in quantitative analysis (Hauser & Warren, 1997; "Socioeconomic status," 2003), two variable were selected in order to measure both financial capital – household income per capita – and cultural capital – parental education. These two variables were not used to create a composite index as the differentiated role of both financial and cultural capitals for students in countries with different tuition polices is of interest to this study.

Household income per capita. All three surveys have extensive questions about the various revenue streams of the individuals living in the surveyed households. Such revenues are combined to provide a total monthly household income that is or can be

converted into a monthly household income per capita. This last measure was used to stratify households into income quintiles, representing the financial quintile to which individuals in such households belong. As socio-economic surveys' primary goal is to measure poverty in a country, there are no missing values on income due to the use of imputation methods from the different statistical agencies.

For Argentina, the household income per capita is collected for the specific month of reference and includes both labor and non-labor income (Dirección Encuesta Permanente de Hogares, 2005). In the case of Brazil, the imputed household per capita income that aggregates all income sources from the household is used. For Chile, the imputed income methodologies changed between 2011 and 2013, but in both cases the total monthly income per capita includes labor and non-labor income.

Overall, for all three countries all sources of income were considered, in an attempt to establish the financial capital of college-aged individual.

The division into quintiles was undertaken by country and survey year in order to take into account economic disparities between the two survey waves (2011 and 2013). Table 6.8 summarizes in U.S. dollars the distribution of income per country and per survey year. Table 6.9 presents the descriptive statistics for the per capita household income quintiles for the three countries for the sample for the participation model. In this sample, a lower representation of the lowest quintile of income, especially in Brazil, is observed which can be accounted for by the sampling decision to include only individuals who graduated high school. In Argentina and Chile, the most represented income quintiles are the third and fourth, i.e. the middle class. In Brazil, the two highest income quintiles are overrepresented.

quintile	Chile Arge		Chile Argentina			Brazil	
	2011	2013	2011	2013	2011	2013	
Lowest	0-113.6	0-144.2	0-38.9	0-66.6	0-59.2	0-75.5	
Second	113.6-168.2	144.3-208.9	38.9-65.1	66.6-106.5	59.5-105.0	75.8-133.2	
Third	168.2-237.3	208.9-291.5	65.1-99.4	106.5-160.9	105.3-161.3	133.5-200.6	
Fourth	237.4-375	291.6-450.3	99.4-159.8	161.0-252.8	161.6-278.7	200.9-345.0	
Highest	375.4-6,183.8	450.4-9,407.1	160.0-4,257.3	253.0-22,933	279.0-36,987.5	345.3-24,263.8	
Missing	0	0	0	0	20,179 (6%)	19,331 (5%)	
Note: The ARS=0.07	currency convers 1USD, 1BRL=0.	tion changes are 2959USD.	as follow (June	23. 2016): 1 C	LP = 0.0015 US	D, 1	

Table 6.8. Income distribution per quintile of wealth **Income**

This table includes the full initial samples of the surveys.

Quintile of income	Chile	Argentina	Brazil	
Lowest	5,718 (16%)	4,118 (15%)	3,026 (9%)	
Second	7,016 (20%)	5,606 (21%)	4,946 (14%)	
Third	7,570 (22%)	6,212 (23%)	6,662 (19%)	
Fourth	7,794 (22%)	5,971 (22%)	9,141 (26%)	
Highest	6,865 (20%)	4,750 (18%)	9,136 (26%)	
Missing	0	0	2,492 (7%)	

Table 6.9. Descriptive statistics for income quintiles, by country.

Note: The figures pertain to the sample used for the participation regression -i.e. college-aged individuals who finished high school and live with their parents.

Parental education. Parental education was chosen as a proxy for cultural capital, which is an available measure for individuals living with their parents. To be more specific, the couple heading the household in which college-aged individuals live were considered as parents. The education of the head couple in the household was considered a good proxy of parental education, as this couple probably has influence on the decisions of college-aged individuals living under their roof.

Different countries display levels of education based on their specific national systems, which might not be comparable. Because this study centers on trends pertaining to higher education, the main distinction is between secondary and higher education, completed or uncompleted (Sewell & Shah, 1968). Therefore, parental education was

defined according to the following categories: less than high school graduation, high school graduation, some college, college graduation. In all three surveys, both father's and mother's education had missing values, but more so paternal education (see Table 6.10). To address this issue, these two variables were merged into a single indicator of parental education. The new parental education variable consists of the level of education for the most educated parent, based on the assumption that most educated individuals are more likely to influence college choice. In the case where one of the parents' education level is missing, the other parent prevails. This new variable also captures relevant data for single parent families.

Table 6.10. Percentage of missing values for parental education, by country.

	Chile	Argentina	Brazil
Mother's education	1,873 (5%)	1,836 (7%)	502 (1%)
Father's education	9,776 (28%)	6,997 (26%)	4,111 (12%)
Parental education	30 (0%)	0 (0%)	0 (0%)
Note: The figures pertain to the sample used for the participation regression i.e. college aged individuals			

Note: The figures pertain to the sample used for the participation regression -i.e. college-aged individuals who finished high school and live with their parents.

The original data for Argentina categorizes the education level of individuals between primary, secondary, tertiary – complete or incomplete – and absence of any education. For Brazil, data on education level respectively for currently attending individuals and for those who are not currently attending any type of educational institution was used. To define the educational attainment of those not currently attending, information on whether the level of education was completed or not was also used. For Chile, the education data collected on every surveyed individual was focused on, and coupled with information on completion. Table 6.11 provides descriptive statistics for parental education by country, including frequency and relative percentage

in the country.

Tuoto offici Desemptive statistics for parental education, of country				
Parental education	Chile	Argentina	Brazil	
Less than high school graduation	14,740 (42%)	8,831 (33%)	10,302 (29%)	
High school graduation	12,804 (37%)	7,310 (27%)	13,167 (37%)	
Some college	1,489 (4%)	3,413 (13%)	2,464 (7%)	
College graduation	5,900 (17%)	7,103 (27%)	9,470 (27%)	
Missing	30 (0%)	0	0 (0%)	

Table 6.11. Descriptive statistics for parental education, by country

Note: The figures pertain to the sample used for the participation model - i.e. college-aged individuals who finished high school and live with their parents.

The high proportion of individuals with their most educated parent having graduated college is a feature of the sampling design. When screening for individuals eligible for higher education participation, i.e. those who at least graduated high school, individuals who already have a high cultural capital were selected. In Argentina and Brazil in particular, this significantly altered the proportion of parental education categories in favor of more education. This is a direct reflection of the K-12 system in these countries.

One potential concern is the possibility of high correlation between both measures of SES, however the correlation coefficients of these variables are 0.40, 0.41, and 0.34 for Chile, Argentina, and Brazil respectively in the participation sample. For the sample for college choice, the correlation coefficients are 0.44, 0.37, and 0.35 for Chile, Argentina, and Brazil respectively. These results show that both measures of SES are not perfectly correlated (see Appendix Tables 1 to 3 for matrixes for the participation model and Appendix Tables 4 to 6 for the college choice model).

Student control variables

Student background variables are included as control variables in the regressions to account for some of the variability that can be explained by student's gender or student's year of birth (Tables 6.12 and 6.13). The students' year of birth was estimated by combining information on their age and the survey year. Using individual's year of birth controls for generational effects in each country, i.e. whether decisions could be explained by the year they entered higher education – including historical effects and availability of programs. Unsurprisingly, for all countries, there are a higher proportion of students born between 1989 and 1993 than other years. This is simply because these individuals were between 18 and 24 years old for both waves of the survey.

Table 6.12 shows that the samples for all three countries slightly over-represent women over men, with a bigger gender gap in Argentina.

Table 6.12. Descriptive statistics for gender, by country.

_	Chile	Argentina	Brazil	
Male	17,189 (49%)	12,208 (46%)	16,950 (48%)	
Female	17,774 (51%)	14,449 (54%)	18,453 (52%)	
Notes: There are no missing values. The figures pertain to the sample used for the participation regression -				
i.e. college-aged individuals who finished high school and live with their parents.				

Table 6.13. Descriptive statistics for birth cohort, by country.

	Chile	Argentina	Brazil
1987	2,058 (6%)	1,804 (7%)	2,296 (6%)
1988	2,288 (7%)	1,788 (7%)	2,542 (7%)
1989	5,080 (15%)	3,732 (14%)	5,036 (14%)
1990	5,663 (16%)	4,078 (15%)	5,134 (15%)
1991	5,708 (16%)	4,334 (16%)	5,407 (15%)
1992	5,307 (15%)	4,208 (16%)	5,320 (15%)
1993	4,576 (13%)	3,521 (13%)	4,843 (14%)
1994	2,602 (7%)	1,835 (7%)	2,693 (8%)
1995	1,681 (5%)	1,357 (5%)	2,132 (6%)

Notes: There are no missing values. The figures pertain to the sample used for the participation regression – i.e. college-aged individuals who finished high school and live with their parents.

When checking the validity of the models, the region in which the individual lives was added as a control variable. This allowed to control for regional socio-economic variability. In particular, it helped control for the availability of higher education opportunities close to the individual's home, and for the diversity in choices with higher number of institutions. The region variable differs with each 3 countries: it includes 15 regions for Chile, 32 for Argentina, and 27 for Brazil. Tables with descriptive statistics per country per regions are included in the appendix (Appendix Tables 7 to 9).

Summary

A summary of all the variables – outcomes, predictors, and control – is presented in Table 6.14 for all three models. The names of dummy variables are indicated in italics. The base column indicates the category or dummy used as the reference for analysis: i.e. the category that others are compared to. For instance, Chile is the reference for the country variable as it is the only one with tuition fees. It is therefore not included in the equation.

The notations provided in this table are used in the remainder of this chapter to present the models.

Factor	Variables	Base
Outcomes		
Higher education	No participation (<i>higher ed=</i> 0)	No participation
participation	Participation (higher $ed=1$)	1 1
Choice of tertiary sector	Public sector $(ihe=0)$	Public sector
5	Private sector (<i>ihe</i> =1)	
Drop out indicator	Did not drop out (0)	
1 I	Dropped out (1)	
Final completed year of	First academic year - acy_1	
higher education	Second academic year - <i>acy</i> ₂	
0	Third academic year - acy_3	
	Fourth academic year $-acy_4$	
	Fifth academic year $-acy_5$	
	Sixth academic year $-acy_6$	
Individual socio-economic l	background	
Household monthly per	Lowest income quintile $-inc_1$	Lowest income
capita income	Second income quintile $-inc_2$	quintile – inc_1
•	Third income quintile $-inc_3$	
	Fourth income quintile $-inc_4$	
	Highest income quintile – <i>inc</i> ⁵	
Highest parental	Less than high school graduation –	High school
educational attainment	$par_{ed_{l}}$	graduation –
	High school graduation – par_ed ₂	par_{ed_2}
	Some college – <i>par_ed</i> ₃	
	College graduation $- par_{ed_4}$	
Fixed effect		
Country	Chile – cl	Chile – <i>cl</i>
	Argentina – arg	
	Brazil – <i>br</i>	
Cohort effect	Born in 1987 – $year_1$	Born in 1987 –
	Born in 1988 – $year_2$	year ₁
	Born in 1989 – $year_3$	
	Born in 1990 – $year_4$	
	Born in 1991 – <i>year</i> ⁵	
	Born in 1992 – $year_6$	
	Born in 1993 – <i>year</i> ⁷	
	Born in 1994 – $year_8$	
	Born in 1995 – <i>year</i> ₉	
Control variables		
Gender	Male - <i>male</i>	Female - <i>female</i>
	Female - <i>female</i>	
Region	One dummy for each region in the	Region ₁
	specific country: <i>region_i</i> with	
	• i between 1 and 15 for Chile	
	• i between 1 and 27 for Brazil	
	• i between 1 and 32 for	
	Argentina)	

Table 6.14. Description of variables

Missing data

As seen in the previous descriptions and tables, missing data is not an important issue in the models proposed with all variables having less than 10 percent of missing data.

Analytical Strategy

For all three questions discussed in this dissertation, individual models are run for each country as well as a combined model pooling all the data and creating one comprehensive model. This allows an in-depth analysis within and between countries.

Higher Education Participation

The first research question in this study asks: what is the difference in the relationship between the socio-economic backgrounds of individuals and their participation in higher education in countries with different tuition fee policies? This research question aims at identifying individual socio-economic characteristics that impact participation and how they differ between countries with and without tuition fees.

The study of participation consists of the analysis of a dichotomous outcome: whether a qualified college-age individual participates or not in higher education. This analysis therefore called for the use of logistic regression. A logistic regression uses a logit transformation and enables the prediction of odds and probabilities of the outcome being 1 versus it being 0 (Peng, Lee, & Ingersoll, 2002). Individual models. For each individual country, two logistic regressions were run: with and without region control. This allowed to check the stability of the coefficients for the individual-level controls. It could also improve the fit of the individual models. Equation (1) is the model without region, and equation (2) includes the regional control variable. Equation (2) includes different final indices specifications for the region component, based on each country having a different number of regions. These indices are indicated in the following order and format: Chile/Argentina/Brazil.

(1)
$$\log\left(\frac{higher_{ed}}{1-higher_{ed}}\right)$$

= $\alpha + \sum_{i=2}^{5} \beta_{1 to 4} \times inc_{i} + \sum_{i \in \{1,3,4\}} \beta_{5 to 7} \times par_{ed_{1}}$
+ $\sum_{i=2}^{9} \beta_{8 to 16} \times year_{i} + \beta_{17} \times female + \varepsilon$

(2)
$$\log\left(\frac{higher_{ed}}{1 - higher_{ed}}\right)$$
$$= \alpha + \sum_{i=2}^{5} \beta_{1 to 4} \times inc_{i} + \sum_{i \in \{1,3,4\}} \beta_{5 to 7} \times par_{ed_{1}}$$
$$+ \sum_{i=2}^{9} \beta_{8 to 16} \times year_{i} + \beta_{17} \times female$$
$$+ \sum_{i=2}^{15/32/27} \beta_{18 to (32/49/44)} \times region_{i} + \varepsilon$$

Combined model. To analyze all three countries simultaneously, a country fixedeffects model was designed (Bryan & Jenkins, 2013). Data from all three countries were pooled, and the model includes one intercept per country, thus controlling for unobserved country specificities (historically, culturally, and in the higher education system). In this model, fixed effect for birth cohort and for the interaction between birth cohort and country were also included. This allowed to control for generational and historical factors in the region as a whole, as well as in each country separately. Coefficients for the individual-level socio-economic predictors were allowed to vary by country using interactions (Bryan & Jenkins, 2013). The chosen model to study the participation of students from different socio-economic backgrounds depending on their country is summarized in Table 6.15. The full equation is included in the appendix (Equation 1). Standard errors were clustered at the household level to account for the potential correlation in outcomes within a household.

Outcome	Fixed-effects	Individual-level socio- economic predictors	Control
higher_ed	Arg	Inc_x (x=2 to 5)	Female
$\log\left(\frac{1-higher_ed}{1-higher_ed}\right)$	Br	$Par_ed_y (y \in \{1, 3, 4\})$	
0 -	<i>Year_z</i> ($z=2$ to 9)	Arg * inc_x (x=2 to 5)	
	Arg * year _z ($z=2$ to 9)	Br * inc_x (x=2 to 5)	
	Br * year _z (z=2 to 9)	<i>Arg</i> * <i>par_ed</i> _y ($y \in \{1, 3, 4\}$)	
		$Br * par_{ed_y} (y \in \{1, 3, 4\})$	

Table 6.15. Description of the full participation model

Note: The notation used here refers to Table 6.12

Only one combined model is run, without regions, because of the impossibility to homogenize the region variable across country. The regional effect will be discussed using individual models and comparing them.

College Choice

The second research question in this study asks: what is the difference in the relationship between the socio-economic background of individuals and their college choice in countries with different tuition fee policies? This research question aims at identifying socio-economic characteristics that impact college choice and how they differ between countries with and without tuition fees. Like in the case of participation, the chosen model to study the college choice of students from different socio-economic backgrounds depending on their country is a logistic regression.

Individual models. Similar to participation, two logistic regressions were run, the second including a region fixed effect. The models are presented in equations (3) and (4). The indices for the region component in equation (4) follow the same logic as before.

(3)
$$\log\left(\frac{ihe}{1-ihe}\right)$$

= $\alpha + \sum_{i=2}^{5} \beta_{1 to 4} \times inc_{i} + \sum_{i \in \{1,3,4\}} \beta_{5 to 7} \times par_{ed_{1}}$
+ $\sum_{i=2}^{9} \beta_{8 to 16} \times year_{i} + \beta_{17} \times female + \varepsilon$

(4)
$$\log\left(\frac{ihe}{1-ihe}\right)$$

$$= \alpha + \sum_{i=2}^{5} \beta_{1 to 4} \times inc_{i} + \sum_{i \in \{1,3,4\}} \beta_{5 to 7} \times par_{ed_{1}}$$

$$+ \sum_{i=2}^{9} \beta_{8 to 16} \times year_{i} + \beta_{17} \times female$$

$$+ \sum_{i=2}^{15/32/27} \beta_{18 to (32/49/44)} \times region_{i} + \varepsilon$$

Combined model. The statistical model for the combined model is very similar to the one used to answer the first research question – a fixed-effect country model - and is described in Table 6.16. Similar to the model above, this model used clustered standard error by household. A combined model with region was not found appropriate.

Outcome	Fixed-effects	Individual-level socio- economic predictors	Control
ihe	Arg	Inc_x (x=2 to 5)	Female
$\frac{\log (1 - ihe)}{1 - ihe}$	Br	$Par_ed_y (y \in \{1, 3, 4\})$	
	<i>Year_z</i> ($z=2$ to 9)	Arg * inc_x (x=2 to 5)	
	Arg * year _z ($z=2$ to 9)	$Br * inc_x$ (x=2 to 5)	
	Br * year _z (z=2 to 9)	<i>Arg</i> * <i>par_ed</i> _y (y \in {1, 3, 4})	
		$Br * par_ed_y (y \in \{1, 3, 4\})$	

Table 6.16. Description of the full college choice model

Note: The notation used here refers to Table 6.12

Attrition

The final model of this dissertation addresses the last issue of interest in the study of access and success: attrition. The model designed answers the following research

question: what is the difference in the relationship between the socio-economic background of individuals and their risk to drop out in countries with different tuition fees policies? Survival analysis is the methodology necessary to answer such a question.

Survival analysis. Survival analysis is a statistical methodology that is used in cases where employing ordinary regression would be problematic due to the incompleteness of data and the violation of the assumption of normality. More specifically, survival analysis is concerned with the study of elapsed time between a known time of origin and the occurrence of an event. Analysis is made complicated by censoring, which means that the researcher does not have the time-to-event data for all participants since, at the end of the observation period, some participants might not have yet experienced the end event.

As such, survival analysis is used when the dependent variable is composed of two pieces of information: 1) a time measurement from the time of origin, and 2) an indicator for the occurrence of the final event (Guo, 2009; Singer & Willett, 2003). Similarly, Singer and Willett (2003) recommended using "the whether and when test." This logic test simply states that survival analysis is an appropriate methodology when the researcher is interested in when an event occurs or whether an event occurs.

Therefore, for the study of higher education drop-out rates, I use a survival analysis approach to understand whether students drop-out and when. The two main characteristics are gathered: the time of origin is the enrollment in higher education, and the event is dropping out (non-completion of undergraduate study and loss of the student
status). Censoring is present in that not all students in the sample will have dropped out yet or graduated, so for some of them whether and when the event will occur is unknown.

Truncation and censoring. As said before, one important limitation in this model is that it is impossible to include individuals who already finished their undergraduate degree because of the lack information on the length of study for Argentina and Brazil. Therefore, the samples used include only individuals who dropped out and individuals who are still studying. Such sampling decisions are called truncation in survival analysis: in this case, the sample is left-truncated since only people who entered higher education and who did not complete their bachelor degree at the time of survey are observed. The data is also right-censored: current students might drop out in the future and therefore the failure event (dropping out) might not be observed for them.

Hazard. Survival analysis centers around the concept of hazard, which is defined as the limit when the time interval tends to 0 of the probability of the failure event happening during a time interval, conditional on the fact that it did not happen before the start of the interval, divided by the length of the time-interval:

$$\lambda(t) = \lim_{\Delta t \to 0} \frac{\Pr(t + \Delta t > T \ge t | T \ge t)}{\Delta t}$$

where *T* indicates the time of the failure event, *t* is the time of the start of the interval and Δt is the interval length. The hazard is zero when the risk of failure is zero, while it is infinity when the failure event is deemed to happen.

In this dissertation, the hazard of the drop-out event is at the core. The data available is discrete: time is not measured continuously but in terms of academic years. Whether a drop out event occurred or not is only measured at the end of each academic year. Therefore, the discrete time hazard model is the most appropriate.

The aim of the discrete time hazard model is to answer the question "What is the relationship between the risk of event occurrence in each time period and predictors?" (Singer and Willet, 2003, p. 371). Therefore, the hazard function can be expressed as:

$$h(t_{ij}) = P[T_i = j | T_i \ge j \text{ and } X_{1ij} = x_{1ij}, \dots, X_{Pij} = x_{Pij}]$$

where Xs indicate predictors.

To further the analysis of the discrete data, one needs to decide on a baseline hazard model. The most flexible representation of time is used, the non-parametric one with no assumption: a set of dummies indicating time periods (Singer and Willett, 2003). The discrete time-hazard model can thus be written as, with D_i indicating the time periods:

$$logit(h(t_j)) = \alpha_1 D_1 + \alpha_2 D_2 + \dots + \alpha_J D_J + \beta_1 X_1 + \dots + \beta_P X_P$$

This is a standard logistic regression with one intercept per time period (the alphas) and coefficients that show the effect of a difference of one unit in the predictor on the logit (the betas).

Dataset preparation. Datasets used for survival analysis need to have a persontime unit format. Therefore, the last step in preparing for the analysis of the datasets is to change them to person-year datasets, i.e. to have one entry per individual per academic year. For individuals who dropped out, the failure event is 1 only for the entry indicating the last completed year.

(5)
$$\log\left(\frac{h(t_j)}{1-h(t_j)}\right)$$

 $(1 - n(t_j))$ $= \alpha_1 \ acy_1 + \alpha_2 \ acy_2 + \alpha_3 \ acy_3 + \alpha_4 \ acy_4 + \alpha_5 \ acy_5$ $+ \alpha_6 \ acy_6 + \sum_{i=2}^{5} \beta_{1 \ to \ 4} \times inc_i + \sum_{i \in \{1,3,4\}} \beta_{5 \ to \ 7} \times par_ed_1$ $+ \sum_{i=2}^{9} \beta_{8 \ to \ 16} \times year_i + \beta_{17} \times female + \varepsilon$ $(6) \ \log\left(\frac{h(t_j)}{1 - h(t_j)}\right)$ $= \alpha_1 \ acy_1 + \alpha_2 \ acy_2 + \alpha_3 \ acy_3 + \alpha_4 \ acy_4 + \alpha_5 \ acy_5$ $+ \alpha_6 \ acy_6 + \sum_{i=2}^{5} \beta_{1 \ to \ 4} \times inc_i + \sum_{i \in \{1,3,4\}} \beta_{5 \ to \ 7} \times par_ed_1$ $+ \sum_{i=2}^{9} \beta_{8 \ to \ 16} \times year_i + \beta_{17} \times female$ $+ \sum_{i=2}^{9} \beta_{8 \ to \ 16} \times year_i + \beta_{17} \times female$ $+ \sum_{i=2}^{9} \beta_{18 \ to \ (32/49/44)} \times region_i + \varepsilon$

The indices for regions indicate, like before, the number of regions differing across countries and are in the following order: Chile/Argentina/Brazil. The analysis is limited to 6 academic years after starting higher education, as these are the only years for which there is consistent data across the three countries. The standard errors are clustered at the individual level to account for the correlation across annual outcomes for one individual.

Combined model. The combined model for attrition pools the data from the three countries into one unique dataset. A fixed-effect country discrete time hazard model is then applied to the data, allowing the direct comparison of the effect of the socio-economic factors on attrition in the different countries. Like in the individual models, 6 academic years are included, that are interacted with the country variable to control for the difference in participation and attrition per country per academic year. Fixed-effect for countries and birth cohort are added, as well as the interaction between country and birth cohort. The combined model for attrition is described in Table 6.17.

Table 6.17. Descr	<i>able 6.17</i> . Description of the full attrition model				
Outcome	Time	Fixed-effects	Individual-level socio-	Control	
	variable		economic predictors		
$(h(t_i))$	Acy_t (t=1 to 6)	Arg	Inc_x (x=2 to 5)	Female	
$\log\left(\frac{(f)}{1-h(t)}\right)$	Arg * acy_t	Br	$Par_ed_y (y \in \{1, 3, 4\})$		
$(\mathbf{I} - \mathbf{n}(\mathbf{i}_j))$	(t=1 to 6)	<i>Year_z</i> ($z=2$ to	Arg * inc_x (x=2 to 5)		
	Br * acy_t (t=1	9)	$Br * inc_x$ (x=2 to 5)		
	to 6)	Arg * year _z	Arg * par_ed _y (y \in {1, 3,		
		(z=2 to 9)	4})		
		$Br * year_z$	$Br * par_{ed_y} (y \in \{1, 3, 4\})$		
		(z=2 to 9)			

Note: The notation used here refers to Table 6.12

As for the individual models, this model does not include a constant and uses clustered standard error by individual.

Checking the Models and Goodness of Fit

Running both individual models and a combined model allows the verification of the validity of the combined model in light of its comparison with individual ones. The graph of expected probabilities for the individual and the combined models should be similar, although small differences are acceptable, as they are explained by (1) the averaging of the gender coefficient across all three countries, and (2) the fact that the residual error variance in the combined model is the same across all three countries.

Another model verification is achieved by adding the region control variable and comparing the models with and without it. This helps check the stability of the models, using goodness of fit, and of the individual-level coefficients, comparing effect sizes across models.

To analyze the goodness of fit of the models, Tjur's coefficient of discrimination (Tjur's D) is used, which is an appropriate goodness of fit statistics for binary logistic regressions (Tjur, 2009). Tjur's D is calculated by subtracting the mean of the expected probabilities for the first category of the dependent variable to the mean of the expected probabilities for the second category of the dependent variable (Allison, 2013; Tjur, 2009). Tjur's D ranges from 0 to 1. If D equals 0, all the predicted probabilities are the same and the model has no discriminatory power. If D equals 1, the model is predicting perfectly, with all predicted probabilities being equal to the observed ones. As all the models have binary dependent variables, the use of Tjur's D to analyze goodness of fit is relevant. However, the specificity of the discrete time analysis model calls for caution in the use of goodness of fit statistics, and therefore for these models the example of Singer and Willett (2003) was followed and the goodness of fit assessed using the BIC statistic.

Conclusion

This chapter presents in comprehensive details the models used to answer the three research questions that define this dissertation. It also provides a comprehensive

128

insight into the databases used and the different variables and coding choices made. With all this said, the following chapters discuss the results obtained with these models and their interpretation.

7. RESULTS OF THE PARTICIPATION MODEL

This chapter introduces the results obtained from running the models of participation in higher education presented in the previous chapter. Results are presented focusing first on individual models and then on the combined model coupled with the comparison of the individual models.

Individual Models

Chile

Table 7.1 presents the outcomes from the logistic regressions without and with regions (models 1 and 2 respectively). Overall, the fit of these models is weak with Tjur's Ds of 0.14 for both models. This shows that little of the residual variance in participation is accounted for by the region in which Chilean individuals live. However, the addition of the regional variable changes a little the income quintile coefficients, as will be discussed later, showing that financial capital has distinctive links to participation depending on the Chilean region.

In both models, the financial capital of an individual as indicated by the income quintile of the household they live in is a significant predictor of participation, although the odds ratios are moderate in size for the four first income quintiles. For example, using the first model, with all other variables remaining constant, belonging to the second income quintile increases the odds of participation by a factor of only 1.08 when compared to belonging to the first income quintile. Holding all other variables constant, belonging to the fourth income quintile increases the odds of participation by a factor of 1.21 when compared to belonging to the first income quintile. However, the difference is more pronounce at the extreme, since belonging to the highest income quintile increases the odds of participation by a factor of 1.84 when compared to belonging to the first income quintile.

Similarly, parental education is a significant predictor in both models, however the effect size indicated by the odds ratio are more important. Looking at model 1, keeping all other variables constant, having parents who did not graduate high school decreases the odds of participation by a factor of 0.47 when compared to having at least one parent who graduated high school. On the other hand, holding all other variables constant, having parents who did some college or who graduated college increases the odds of participation by a factor of 2.59 and 2.98, respectively, when compared to having one parent who graduated high school.

Although some significant differences can be observed, birth cohorts are pretty stable in participation, with significant odds ratios not exceeding 1.24 in the first model (for year of birth equal to 1994 compared to 1987). As an exception, individuals born in 1995 have significantly lower odds of participation, with their odds of participation decreasing by a factor of 0.27 in the first model. This could be explained by the timeline of the CASEN survey, which is usually undertaken between November and January. This means that some 18 years old – i.e. those born in 1995 in this model – might have finished high school but not yet have made a definitive choice as to whether they will attend higher education or not (the academic year in Chile finishes in December and starts again in March). The very low odds ratio probably reflects this uncertainty.

131

In both models, keeping all other variables constant, being a female increases the odds of participation by a factor of 1.4.

	Model 1	Model 2
Quintile of per capita income		
Second	1.08* (.044)	1.11** (.046)
Third	1.13*** (.046)	1.20*** (.049)
Fourth	1.21*** (.05)	1.32*** (.055)
Highest	1.84*** (.086)	2.09*** (.101)
Parental education		× ,
Less than High school graduate	0.47*** (.013)	0.46*** (.013)
Some college	2.59*** (.193)	2.57*** (.191)
College graduate	2.98*** (.133)	2.88*** (.129)
Year of birth	× /	、 <i>、 、</i>
1988	.92 (.058)	.92 (.059)
1989	1.10* (.060)	1.07 (.059)
1990	1.12** (.060)	1.09 (.059)
1991	1.03 (.056)	1.00 (.055)
1992	.95 (.052)	.92 (.051)
1993	0.77*** (.044)	0.75*** (.043)
1994	0.76*** (.048)	0.72*** (.046)
1995	0.27*** (.021)	0.26*** (.020)
Gender	()	
Female	1.41*** (.033)	1.43*** (.034)
Region		Yes
Constant	1.10 (0.065)	0.72*** (0.058)
Tjur's D	0.14	0.14

Table 7.1. Odds ratio¹ of participation for the Chilean individual model

Note: Model 1 does not include dummies for regions, while model 2 does. Robust standard error clustered by household are provided in-between parenthesis.

The base for quintile of per capita income is the lowest, i.e. the 20 percent poorest households in the country. The base for parental education is high school graduation. The base for birth cohort is 1987 and the base for gender is male.

* p<0.1 ** p<0.05 *** p<0.01

¹ Odds ratio are calculated as the exponential of the logistic regression coefficients.

In order to better understand what this means as to the relationship between students' socio-economic backgrounds and their participation in higher education, the predicted probability² of participation in higher education is plotted against each predictor separately. This is done for both models, using boxplots to show the regional variation in model 2. Figures 7.1 to 7.4 show these results for a male born in 1991.

Figure 7.1, by income quintile, corroborates the results above, i.e. that although the probability of participation gets higher with more financial capital, the odds are similar over the 4 first income quintiles – increasing from about 0.53 for individuals in the first income quintile to around 0.57 for individuals in the fourth income quintile. Participation peaks for individuals from the richest backgrounds with a participation probability of about 0.67, which is significantly higher than for other income quintiles.

² Predicted probabilities are computed as $\frac{e^{a+BX}}{1+e^{a+BX}}$



Figure 7.1. Probability of participation in higher education in Chile for a male born in 1991 whose most educated parent graduated high school, by household income

Figure 7.2 is the same graph for model 2, i.e. with an added control variable for the region where the individual lives. The boxplots show the variation in probability among regions in Chile. For the three middle quintiles, the difference between the lowest and highest probabilities for the regions is 0.2, with 50 percent of the probabilities clustered in a 0.1-wide range. Medians are pretty low in the overall range of probabilities, indicating more exceptional high probabilities. This shows overall some regional variations, but not drastic ones. At the extreme, i.e. for the lowest and highest income quintiles, the picture is different. Individuals in the lowest income quintile have more varying probabilities to participate among regions, while the probabilities are somewhat more clustered for individuals in the highest income quintile. Interestingly, the median for the highest income quintile is quite high in the total range of probabilities, indicating fewer low probabilities.

Figure 7.2. Probability of participation in higher education in Chile for a male born in 1991 whose most educated parent graduated high school, by household income over regions



Figure 7.3 shows the probability of participation for model 1 by parental education, for a male born in 1991 belonging to the third income quintile. It shows a steep increase in the probability of participation with higher parental education, from less than a 40 percent likelihood to participate for individuals whose most educated parent did not graduate high school to nearly an 80 percent chance to participate for individuals whose most educated parent graduate college.



Figure 7.3. Probability of participation in higher education in Chile for a male born in 1991 from the third quintile of household income, by parental education

Figure 7.4 shows the same graph for the second model, with the variation by region displayed with boxplots. The variation among regions is relatively modest: with the difference between the lowest and highest probability not exceeding 0.2, and 50 percent of the regional probabilities of participation clustered in a 0.05 range over all values of parental education. When comparing Figure 7.2 and 7.4, similar variation among regions in the probabilities of participation for the two predictors can be noticed. The least variation is observed for individuals with most educated parents, who are somewhat impervious to regional variation, while the most variation is observed for the lowest quintile of household income where participation seem somewhat dependent on the region.





Argentina

Table 7.2 presents the outcomes from the logistic regressions without and with regions (models 1 and 2 respectively) for Argentina. As for Chile, the fit of the two models is weak with Tjur's D of about 0.14 for both models. The addition of the region control variable to the model has little impact, with Tjur's D improving by 0.01. This shows that little of the variance in participation is accounted for by the region in which Argentinians live. As in the case of Chile, adding a region variable does affect the coefficient, especially the ones of the highest income quintiles, but also more moderately the ones for parental education.

In both models, the financial capital of an individual as indicated by the income quintile of their household is a significant predictor of participation, although the odds ratios are modest in size. For example, using the first model, with all other variables remaining constant, belonging to the second income quintile increases the odds of participation by a factor of 1.16 compared to belonging to the first income quintile. Belonging to the fourth income quintile increases the odds of participation by a factor of 1.21 compared to belonging to the first income quintile. Contrary to Chile, the model without regions shows a moderate effect size for income even at the extreme, since belonging to the wealthiest income quintile only increases the odds of participation by a factor of 1.40 compared to belonging to the poorest quintile. The second model shows a larger effect size for the richest individuals, as their odds of participation are increased by a factor of 1.71 compared to individuals in the poorest quintile.

Similarly, parental education is a significant predictor in both models, however the effect size indicated by the odds ratio are more important than for income quintiles. Looking at model 1, keeping all other variables constant, having parents who did not graduate high school decreases the odds of participation by a factor of 0.60 compared to having at least one parent who graduated high school. On the other hand, having a parent who did some college or who graduated college increases the odds of participation by factors of 3.00 and 3.95 percent, respectively, compared to one's most educated parent having graduated high school. Like in Chile, it seems that parental education has a stronger relationship with participation than income quintile.

Birth cohorts are pretty stable in participation, with no significance in the first model and significant odds ratios not exceeding a 21 percent in the second model.

In both models, keeping all other variables constant, being female increases the odds of participation by a factor greater than 1.9.

	Model 1	Model 2
Quintile of per capita income		
Second	1.16*** (.060)	1.19*** (.062)
Third	1.25*** (.066)	1.32*** (.071)
Fourth	1.21*** (.067)	1.36*** (.078)
Highest	1.40*** (.087)	1.71*** (.113)
Parental education		
Less than High school graduate	0.60*** (.027)	0.61*** (.027)
Some college	3.00*** (.198)	2.88*** (.192)
College graduate	3.95*** (.224)	3.70*** (.212)
Year of birth		
1988	1.01 (.080)	1.02*** (.082)
1989	.97 (.071)	0.97* (.072)
1990	1.00 (.071)	1.01 (.073)
1991	1.09 (.077)	1.11*** (.080)
1992	1.06 (.077)	1.09*** (.080)
1993	1.08 (.081)	1.11*** (.084)
1994	1.17* (.101)	1.21*** (.105)
1995	1.12 (.106)	1.17*** (.112)
Gender		
Female	1.93*** (.066)	1.95*** (.068)
Region		Yes
Constant	0.48 (0.037)	0.49 (0.071)
Tjur´s D	0.14	0.15

Table 7.2. Odds ratio of participation for the Argentinian individual model

Note: Model 1 does not include dummies for regions, while model 2 does. Robust standard error clustered by household are provided in-between parenthesis.

The base for quintile of per capita income is the lowest, i.e. the 20 percent poorest households in the country. The base for parental education is high school graduation. The base for birth cohort is 1987 and the base for gender is male.

* p<0.1 ** p<0.05 *** p<0.01

Similar to what was done for Chile, the probability of participation for both models 1 and 2 is plotted, first by income quintile and second by parental education. Results for the first models are shown in figures 7.5 and 7.7, while the ones for model 2 showing the variation in region using boxplots can be found in figures 7.6 and 7.8.

Figure 7.5 shows the difference in higher education participation by income

quintile for males born in 1991 whose most educated parent graduated high school.

Overall, it shows that the higher the income quintile, the higher the probability to participate, although the difference is quite modest. The lowest probability is registered for the poorest individuals who have a little over a 47 percent probability of participation. The highest probability is for individuals from the richest backgrounds, with about a 55 percent likelihood of participation. One exception to the overall upward trend is for individuals belonging to the fourth quintile who have slightly lower participation probabilities than individuals from the third quintile, but this difference is not significant.



Figure 7.5. Probability of participation in higher education in Argentina for a male born in 1991 whose most educated parent graduated high school, by household income

Figure 7.6 presents the same graph for the second model, and displays the variation between the different regions in Argentina using boxplots. This figure shows more variation among regions the richer the individual. Indeed, probabilities of

participation in higher education for individuals from the two lowest income quintiles range across 0.2 point, with 50 percent of the regional probabilities in about a 0.8 interquartile range – similar to what was observed overall in Chile. Probabilities for individuals from the third quintile have a slightly larger range – about 0.25 – but a similar interquartile. For the two highest income quintiles, the variation is somewhat more important, with the range width for the probabilities exceeding 0.25, and an interquartile range exceeding 0.1. This shows that for the richest students in Argentina, participation probabilities are slightly more related to the region where the individual lives. The odds of participation for the fourth quintile are particularly striking with the lowest regional probabilities being similar to the lowest probabilities for individuals from the lowest economic quintile. For all quintiles, the median is towards the middle of the range, indicating a consistent distribution of probabilities for different regions across the range. Overall, compared to Chile, a reverse trend is observed with more variation in highest income quintiles.

Figure 7.6. Probability of participation in higher education in Argentina for a male born in 1991 whose most educated parent graduated high school, by household income over regions



Figure 7.7 shows the probability of participation for model 1 by parental education, for a male born in 1991 belonging to the third income quintile. It shows a steep increase in the probability to participate with higher parental education, from less than a 40 percent likelihood of participation for individuals whose most educated parent did not graduate high school to more than an 80 percent chance of participation for individuals whose most educated parent graduate college. This is quite similar in magnitude to what was observed in Chile.



Figure 7.7. Probability of participation in higher education in Argentina for a male born in 1991 from the third quintile of household income, by parental education

Figure 7.8 shows the same graph for the second model, with the variation among regions. As was the case for Chile, the variation among region is small: with the difference between the lowest and highest probability not exceeding 0.25, and 50 percent of the regional probabilities of participation clustered in a 0.1 range over all values of parental education. There is overall less variation in participation among region with greater parental education. Similar to Chile, when looking at both figures 7.6 and 7.8, similar regional variation by income quintile and by parental education can be noticed – with the lowest variation observed for individuals with the most educated parents. However, contrarily to Chile, the highest variation is observed for the highest household income quintile. The outliers with low participation for the two categories of most educated parents is the same region, Comodoro Rivadavia in Patagonia. In this region,

parental higher education participation does not translate into offspring participation as

much as in other regions.

Figure 7.8. Probability of participation in higher education in Argentina for a male born in 1991 from the third quintile of household income, by parental education and over regions



Brazil

Table 7.3 presents the outcomes from the logistic regressions without and with regions (models 1 and 2 respectively) for Brazil. The addition of the region control variable to the model has little impact, with Tjur's D improving by 0.01. This shows that little of the variance in participation is accounted for by the region in which Brazilian individuals live.

In both models, the financial capital of an individual as indicated by the income quintile of their household is a significant predictor of participation, with quite important coefficient sizes. For example, using the first model, with all other variables remaining constant, belonging to the second and third income quintile increases the odds of participation by factors of 1.25 and 1.88 respectively, when compared to belonging to the poorest income quintile. Belonging to the fourth and fifth income quintiles increases the odds of participation by factors of are 287 and 741 percent, respectively, when compared to the first income quintile. Contrary to Chile and Argentina, the Brazilian model shows that income quintile is not only a significant predictor of participation, but that differences in participation odds are extremely large.

Similarly, parental education is a significant predictor in both models. Looking at model 1, keeping all other variables constant, having parents who did not graduate high school decreases the odds of participation by a factor of 0.61 when compared to having at least one parent who graduated high school. On the other hand, the odds of participation of individuals whose parent did some college and graduated college are increased by factors of 1.62 and 2.44, respectively, compared to individuals with at least one parent who graduated high school. These coefficients are more in line with what is observed in Chile and Argentina, making Brazil the only country in this sample to have higher differences in odds of participation based on income than on parental education.

In both models, keeping all other variables constant, there is no statistically significant difference in odds of participation for individuals born between 1988 and 1991 compared to the reference – i.e. individuals born in 1987. Interestingly, keeping all other variables constant, being born between 1992 and 1995 decreases the odds of participation when compared to being born in 1987, with odds ratio ranging from 0.89 for the 1992 cohort to 0.68 for the 1995 cohort.

145

In both models, keeping all other variables constant, females have significantly

higher odds of participation than males, by a factor greater than 1.7.

	Model 1	Model 2
Quintile of per capita income		
Second	1.25*** (.083)	1.26*** (.083)
Third	1.88*** (.12)	1.91*** (.119)
Fourth	2.87*** (.17)	2.97*** (.181)
Highest	7.41*** (.45)	7.77*** (.488)
Parental education		
Less than High school graduate	0.61*** (.021)	0.60*** (.021)
Some college	1.62*** (.084)	1.58*** (.083)
College graduate	2.44*** (.084)	2.37*** (.082)
Year of birth		
1988	.95 (.063)	.96 (.063)
1989	.98 (.057)	.98 (.058)
1990	1.02 (.058)	1.02 (.059)
1991	1.02 (.059)	1.02 (.059)
1992	0.89* (.052)	0.89** (.052)
1993	0.77*** (.046)	0.77*** (.046)
1994	0.86** (.058)	0.86** (.058)
1995	0.68*** (.051)	0.68*** (.059)
Gender		
Female	1.73*** (.045)	1.74*** (.046)
Living region		Yes
Constant	0.10 (0.008)	0.10 (0.15)
Tiur's D	0.21	0.22

Table 7.3. Odds ratio of participation for the Brazilian individual model

Note: Model 1 does not include dummies for regions, while model 2 does. Robust standard error clustered by household are provided in-between parenthesis.

The base for quintile of per capita income is the lowest, i.e. the 20 percent poorest households in the country. The base for parental education is high school graduation. The base for birth cohort is 1987 and the base for gender is male.

* p<0.1 ** p<0.05 *** p<0.01

_

-

Similar to what was done for Chile and Argentina, the probability of participation

is plotted for both models 1 and 2, first by income quintile and second by parental

education. Results for the first models are shown in figures 7.9 and 7.11, while the ones for model 2 showing the regional variations using boxplots can be found in figures 7.10 and 7.12.

Figure 7.9 displays graphically the income gap in participation that was already alluded to through odds ratio. There is a steep increase in participation with richer backgrounds. At the extreme, individuals from the poorest financial background, i.e. belonging to the first household income quintile, have only a 15 percent likelihood of participation, while individuals from the wealthiest financial background have a 55 percent likelihood of participation. These are strikingly different results from both Chile and Argentina, with a very important income gap in the probability of participation, and overall lower enrollment probabilities.

Figure 7.9. Probability of participation in higher education in Brazil for a male born in 1991 whose most educated parent graduated high school, by household income



Figure 7.10 presents the same graph for the second model with the variation by region. Overall it shows little regional variation over the lowest income quintiles, with all probabilities closely clustered. Like in Argentina, there seems to be more regional variation in participation in higher education with increasingly wealthy socio-economic backgrounds. However, when compared to both Argentina and Chile, Brazil's higher education participation varies overall less by region. Inequities in participation by income quintiles seem to be prevalent in all Brazil. Outliers show two regions that have higher participation across three to four income quintiles: Roraima and Paraiba. The first is the least populated region in Brazil, therefore high participation numbers are likely due to small sample size in the survey. The second is a wealthy and populated region in North-East Brazil, which helps explain higher participation.

Figure 7.10. Probability of participation in higher education in Brazil for a male born in 1991 whose most educated parent graduated high school, by household income over regions



Figure 7.11 displays the probability of participation by parental education. Like in Argentina and Chile, there is a steep increase in participation with greater parental education. Individuals whose parents did not graduate high school have slightly more than 15 percent chance of attending higher education, while individuals with at least one parent who graduated college have about a 45 percent likelihood of participation. Although these probabilities are lower than the ones of both Argentina and Chile, they show the same trend with increasing probabilities with a higher cultural capital. Interestingly, Brazil seem to be the only country in the sample with a significant positive difference in participation between having a parent with some college and having a parent who graduated college.



Figure 7.11. Probability of participation in higher education in Brazil for a male born in 1991 from the third quintile of household income, by parental education

Figure 7.12 shows the graph for participation probabilities for the second model displaying the variation by region using boxplots. For all parental education categories, the range of probabilities among regions do not exceed 0.2, and 50 percent of the probabilities cluster in a 0.1 range. This shows some modest regional variation consistent over all categories, that is similar to what was observed in Chile and Argentina. Outliers are the same as in Figure 7.10.



Figure 7.12. Probability of participation in higher education in Brazil for a male born in 1991 from the third quintile of household income, by parental education and over regions

Combined Model

For the combined model, due to the complexity of the fixed-effect model with interactions, the analysis provided here is mainly based on graphs, although the table with the logit coefficients is provided in appendix (Appendix Table 10). As seen in figures 7.13 and 7.14, the probabilities obtained in the combined model are very similar to the one obtained in the individual models, and trends across quintiles and categories of parental education are the same. This allows to base the comparison of participation equity in these three systems on the combined model.

Figure 7.13 shows the probability of participation for the three countries of interest depending on the financial background, measured through the household income quintile. As seen in the individual model, Brazil is an outlier, with quite lower

participation likelihoods overall and wide differences across income quintiles. This shows that Brazil has a more inequitable system, greatly favoring individuals from wealthier backgrounds. Argentina and Chile have participation probabilities that are overall quite constant across income quintiles, with the exception in Chile of the wealthiest income quintile. This shows overall more equitable systems when it comes to financial means. It is also important to note that the probability of entering higher education when having graduated for high school is higher in Chile, closely followed by Argentina, but remains really low in Brazil. This shows an overall difficulty in Brazil of strengthening the transition between high school and higher education, especially for individuals from the poorest backgrounds.

Figure 7.13. Probability of participation in higher education in all three countries for a male born in 1991 whose most educated parent graduated high school, by household income



Figure 7.14 exposes the importance of the cultural capital, as measured through parental education, in the three countries of interest to this dissertation. For all countries, there is a clear trend upward with higher parental education. As in the case of income, Brazil is the outlier, with quite low participation overall, ranging from about 0.15 to 0.45. Argentina and Chile both have ranges going from around 0.4 to 0.8. When looking at equity through the difference between the lowest and highest probability in one country, Brazil seems to be the most equitable. Chile and Argentina both possess a participation gap twice as large as the one in Brazil, but their lowest participation probabilities (for individuals whose parents did not graduate high school) is on par with Brazil's highest probability of participation (for individuals with a parent who graduated college). This shows that overall more opportunities to attend higher education have been extended in Chile and Argentina, but the improvement in participation is accompanied by a widening of the gap between individuals with lower and higher cultural capital.



Figure 7.14. Probability of participation in higher education in all three countries for a male born in 1991 from the third quintile of household income, by parental education

Conclusion

This chapter shows the results for the models of participation in higher education. It is important to note that the goodness of fit of all of these models is quite weak. In an attempt to improve the fit, interactions were added in all three individual models, including gender and income quintiles, gender and parental education, birth cohort and income quintile, birth cohort and parental education, as well as gender and region. These additions unfortunately did not improve the goodness of fit substantially and therefore the original models were kept.

Overall, Brazil has the lowest enrollment probabilities despite having no tuition in the public system. When looking at the difference in participation depending on individual's financial background, Brazil is also the country with the highest gap in participation between poor and rich backgrounds. When looking at participation by parental education, Brazil shows the smallest gap but this is coupled with extremely low participation probabilities. While the gap between the lowest and highest parental education category in Chile and Argentina is almost twice as large as the one in Brazil, their lowest probability is equal to the highest one in Brazil. Chile and Argentina provide more opportunities for individuals to attend higher education, and although these opportunities seem to be more greatly benefitting individuals with high cultural capital, it also seems to benefit significantly the individuals with lower cultural capital when compared with Brazil. It is interesting to note how similar Chile and Argentina are in terms of the relationship between the socio-economic background of students and participation in higher education, knowing the very different tuition policies prevailing in these countries.

Finally, the individual models also showed the regional variation within each country. All three countries show moderate regional variation. Brazil shows the least variation when looking at participation among income quintiles which shows that inequity based on financial backgrounds is pervasive in Brazil. Chile and Argentina have the least regional variation among parental education, showing the importance of cultural capital in both countries somewhat independently of the region where the individual lives.

8. RESULTS OF THE COLLEGE CHOICE MODEL

This chapter presents the results obtained from running the models of college choice introduced in chapter 6. Following the format of the previous chapter, results are presented focusing first on individual models and then on the combined model coupled with the comparison of the individual models.

Individual Models

Chile

The outcomes of the individual college choice models for Chile are presented in Table 8.1. Model 1 indicates results for the model without regions and model 2 for the model with regions. The fit of the two models is overall very weak, as indicated by the Tjur's D of 0.02 and 0.06, respectively, for models 1 and 2. This indicates that overall the predictors in the model, household income quintile and parental education, are not explaining much of the variation in the choice of sector for higher education. This is in line with the literature that draws on other factors to explain college choice. Although the fit quality remains low, it is tripled by adding the regional controls, probably reflecting the availability factor included in the regional factor. The partial regression coefficients however are very similar in the two models.

In terms of predicting whether the individual attends an institution in the public or private sector, the household income quintile is not particularly strong in Chile. The only observed significant odds ratio between household income quintiles is between the first and fourth ones. In model 1, belonging to the fourth household income quintile increases the odds of choosing the private sector by a factor of 1.18 when compared to belonging to the first income quintile, when all other variables are kept constant.

Parental education, on the other hand, is a significant predictor of college choice. Individuals with less educated parents seem to have higher odds of choosing the private sector. In the first and second models, all other variables being held constant, having parents who did not graduate high school increases the odds of attending the private sector by a factor of 1.41 when compared to one's most educated parent having graduated high school. On the other hand, in the first model, having a parent who did some college or graduated college decreases the odds of attending a private institution by factors of 0.69 and 0.68 respectively when compared to one's most educated parent having graduated high school. This is consistent with Chile's public universities, which in this context means all CRUCH-affiliated universities, being among the best in the country. Additionally, the public sector is confined to universities, with all vocational institutions being private.

In these models for college choice in Chile, the year of birth is not significant. Gender on the other hand is a significant control variable; in both models, when all other variables are being held constant, being female increases the odds of attending a private institution by a factor of 1.19.

	Model 1	Model 2
Quintile of per capita income		
Second	1.02 (.065)	.98 (.064)
Third	1.04 (.066)	1.01 (.065)
Fourth	1.18*** (.07)	1.14** (.074)
Highest	1.11* (.07)	1.01 (.069)
Parental education		
Less than High school graduate	1.41*** (.063)	1.41*** (.064)
Some college	0.69*** (.054)	0.69*** (.054)
College graduate	0.68*** (.033)	0.63*** (.031)
Year of birth		
1988	1.10(.11)	1.09 (.115)
1989	1.06 (.095)	1.05 (.095)
1990	1.18* (.103)	1.15 (.102)
1991	1.18* (.102)	1.17* (.103)
1992	1.10 (.096)	1.10 (.097)
1993	1.18* (.105)	1.16 (.106)
1994	1.03 (.099)	1.02 (.101)
1995	1.00 (.120)	1.00 (.123)
Gender		· · /
Female	1.19*** (.040)	1.19*** (.041)
Region		Yes
Constant	1.95 (0.186)	1.58 (0.197)
Tjur´s D	0.02	0.06

Table 8.1. Odds ratio of choosing the private sector for the Chilean individual model

Note: Model 1 does not include dummies for regions, while model 2 does. Robust standard error clustered by household are provided in-between parenthesis.

The base for quintile of per capita income is the lowest, i.e. the 20 percent poorest households in the country. The base for parental education is high school graduation. The base for birth cohort is 1987 and the base for gender is male.

* p<0.1 ** p<0.05 *** p<0.01

As was done for the participation models, this table is complemented with graphs

showing the marginal effects by income quintile and by parental education for each

model. These are presented in figures 8.1 to 8.4 for a male born in 1991.

Figure 8.1 corroborates the fact that income quintile is not a significant predictor of college choice in Chile. All probabilities are clustered between 0.62 and 0.66, with very little variation between different household income quintiles.

Figure 8.1. Probability of choosing a private institution in Chile for a male born in 1991 whose most educated parent graduated high school, by household income



Figure 8.2 displays the probabilities to attend an institution in the private sector among regions. It shows, overall, some moderate variations among regions in the probability to choose the private sector. For all five income quintiles, the interquartile range is less than 0.1 point wide, which is quite small, with ranges spreading from 0.1 point wide (second and fifth quintiles) to more than 0.3 point wide (third quintile). Interestingly, for all quintiles, there are outliers with one or two regions showing lesser probabilities for attending a private institution (below 0.5). With only 16 public
universities for 15 regions (mostly located in Santiago and Valparaiso), and the remainder of universities and vocational education being private, there is no doubt that availability is an issue in Chile that is reflected in the results below and the importance of outliers. Indeed, the lowest private sector attendance probabilities are registered in two outlier regions in the North of Chile, with only one public university and little private providers. On the other hand, the metropolitan area (Santiago, the capital) is the outlier with higher private sector attendance.



Figure 8.2. Probability of choosing a private institution in Chile for a male born in 1991 whose most educated parent graduated high school, by household income over regions

Figure 8.3 shows the probability of attending a private institution by categories of parental education. It corroborates what has been seen in Table 8.1; namely, that individuals from less educated parents tend to gravitate more toward the private sector.

This could be explained in Chile both by the merit-based exam to enter public universities and by the fact that vocational institutions are private. A steep decrease of the probabilities of attending the private sector can be observed from about 0.71 for individuals with parents who did not graduate high school to about 0.54 for individuals with a parent who did some college or graduated college.

Figure 8.3. Probability of choosing a private institution in Chile for a male born in 1991 from the third quintile of household income, by parental education



Figure 8.4 displays the same probabilities among regions for the second model. The variation in probabilities among regions at the extreme is moderate, with interquartile ranges that are less than 0.1 point and overall ranges of less than 0.2. For individuals with parents who either graduated high school or did some college the variation is more substantial, spreading across more than 0.3 points. As for Figure 8.2, several outliers in terms of lower probabilities of attending a private institution can be observed, probably in line with unequal availability of public institutions in different regions. Outliers represent the same regions as in Figure 8.2.

Figure 8.4. Probability of choosing a private institution in Chile for a male born in 1991 from the third quintile of household income, by parental education over regions



Argentina

Table 8.2 shows the results for both models, without and with the additional regional control factor, for Argentina. Similar to what was observed for the Chilean model, the Tjur's D are very low for both models, below 0.1, although it is more than four times higher in the model with regions. However, the differences in the odds ratios is minimal. This reinforces the conclusion that the predictors are not adequate to account for variation in the odds of college choice.

Contrary to what was observed in Chile, in Argentina, household income quintile is a significant predictor of college choice. The higher the household income the higher the odds of choosing the private sector. Indeed, keeping all other variables constant, the odds of attending a private institution for individuals belonging to the second and third household income quintiles are increased by factors of 1.32 and 1.66 respectively when compared to individuals belonging to the lowest household income quintile (using the first model). Belonging to the fourth and fifth income quintiles increases the odds of attending a private institution by factors of 2.01 and 2.43 respectively when compared to belonging to the lowest income quintile.

As far as parental education is concerned, there is only one significant odds ratio shown by the models: having parents who did not graduate high school decreases the odds of attending the private sector by a factor of 0.78, according to model 1, when compared to having at least one parent who graduated high school. There is no significant difference in odds between individuals with at least one parent who graduated high school and individuals with more educated parents.

There is overall no difference in college choice for birth cohorts in both models. One exception stands out: being born in 1995 (i.e. the youngest cohort in this sample) seems to increase the odds of attending the private sector by a factor of 1.26 compared to being born in 1987, all other variables being kept constant. This should be investigated further, but could be due to the free open-access public universities that high-school graduates probably attend at least at first by default, rather than by informed choice.

Finally, gender is a significant predictor of college choice, although the effect size is moderate. Being female increases the odds of attending the private sector by a factor of 1.13, all other variables in model 1 being kept constant.

	Model 1	Model 2
Quintile of per capita income		
Second	1.32*** (.124)	1.35*** (.131)
Third	1.66*** (.155)	1.69*** (.163)
Fourth	2.01*** (.186)	2.08*** (.202)
Highest	2.43*** (.236)	2.55*** (.264)
Parental education		
Less than High school graduate	0.78*** (.062)	0.79*** (.065)
Some college	1.04 (.088)	1.02 (.089)
College graduate	1.11 (.077)	1.08 (.078)
Year of birth		
1988	1.19 (.155)	1.22 (.162)
1989	1.10 (.129)	1.08 (.132)
1990	1.22* (.140)	1.20 (.141)
1991	1.12 (.128)	1.17 (.138)
1992	1.05 (.119)	1.04 (.121)
1993	.98 (.114)	.99 (.118)
1994	.83 (.112)	.84 (.116)
1995	0.74** (.107)	0.78* (.116)
Gender		
Female	1.13** (.057)	1.16*** (.060)
Region		Yes
Constant	0.10 (0.14)	0.04 (0.010)
Tiur's D	0.02	0.09

Table 8.2. Odds ratio of choosing the private sector for the Argentinian individual model

Note: Model 1 does not include dummies for regions, while model 2 does. Robust standard error clustered by household are provided in-between parenthesis.

The base for quintile of per capita income is the lowest, i.e. the 20 percent poorest households in the country. The base for parental education is high school graduation. The base for birth cohort is 1987 and the base for gender is male.

* p<0.1 ** p<0.05 *** p<0.01

As with Chile, graphs of the estimated probabilities of choosing the private sector versus the public sector in Argentina are provided, first by household income quintile and second by parental education. Figures 8.5 and 8.7 present these graphs for model 1, while figures 8.6 and 8.8 present them for model 2 with boxplots to display regional variation.

Figure 8.5 shows that probabilities of choosing the private sector in Argentina are quite low, which is consistent with the Argentinian higher education system, where private higher education is just starting to develop. This figure shows a linear increase in probabilities with household wealth – from about 0.13 for the lowest income quintile to about a 0.26 probability for the highest income quintile. There is therefore a doubling in probability between the two extreme quintiles.





Figure 8.6 displays the same graph for model 2 with regional variations. It shows increasing variation among regions with higher income quintiles. While the variation for the lowest income quintile is moderate with an interquartile range of 0.1 and a range of 0.25, for the highest income quintile regional variation is more substantial with an interquartile range of 0.15 and a range of nearly 0.5. This shows that the probability of choosing a private institution is more dependent on the region where an individual lives when they come from a wealthy background. This might be due to availability of private institutions: since private higher education is just starting in Argentina, it might not be available to similar extent in different locations even for people who can afford it. The outlier region for the three lowest income quintiles is the same, Salta, the region with the biggest private university in Argentina (Bello, Barsky, & Giménez, 2007).

Figure 8.6. Probability of choosing a private institution in Argentina for a male born in 1991 whose most educated parent graduated high school, by household income over regions



Figure 8.7 corroborates the results seen in Table 8.2 concerning parental education. The probabilities for all categories of parental education are similar, except for a slightly lower expected probability for the individuals whose parents did not graduate high school. For this last category, the probability to attend a private institution is around 0.16, while for the three other categories, it is between 0.19 and 0.22. Contrarily to the case of Chile, in Argentina, parental education is of little importance in explaining variation in college choice.





The regional variation that is controlled for in model 2 is shown in Figure 8.8. It is similar across all parental education categories with interquartile ranges between 0.1 and

0.2, and ranges between 0.3 and 0.4. This shows quite significant regional variation in Argentina. In all categories, lower probabilities of choosing the private sector are about 0.2, showing regions where attending a private institution is a very rare occurrence. On the other hand, the highest probabilities of attending a private institution range from about 0.37 to about 0.43 across categories of parental education. In regions with the highest probabilities, individuals have more than 1/3 probability of choosing a private institution. The outlier represents the Salta region, as was the case in Figure 8.6.



Figure 8.8. Probability of choosing a private institution in Argentina for a male born in 1991 from the third quintile of household income, by parental education and over regions

Brazil

Table 8.3 shows the results for the college choice individual models for Brazil. As was the case for Chile and Argentina, the fit of the model is very low, with Tjur's D of

0.02 for the model without regions and 0.05 for the one with regions. Overall, in all three countries, income quintile and parental education are weak predictors of the sector of higher education an individual chooses to attend. Like in the two previous countries, there is an improvement in Tjur's D with the addition of the region variable as it more than doubled, but it remains relatively low. The addition of the regional control factor in model 2 also changes significantly the coefficients for household income quintiles – unlike in Chile and Argentina – but does not change other coefficients. This indicates that, in Brazil, the same income in different regions does not have the same relationship to college choice, a natural consequence of the size of the country.

Similar to Argentina, the household income quintile seems to be a significant predictor of college choice in both models 1 and 2, with the odds of attending a private institution increasing with wealth. The odds of choosing the private sector are increased by a factor of 1.68 for individuals in the second income quintile compared to individuals in the lowest income quintile, in the first model, keeping all other variables constant. In the first model, the odds ratio peaks between individuals in the first and fifth income quintiles, the latter's odds of attending a private institution being greater by a factor of 3.08. In the second model, the odds ratio peaks for the first and fourth income quintile, the latter's odds of attending a private institution being greater by a factor of 2.35, all other variables being held constant. The odds ratio for the fifth income quintiles in the second model is however very similar, with wealthiest individuals having odds of attending the private sector that are 2.29 higher than the odds of individuals in the poorest income quintile.

In Brazil, having parents who graduated high school marks an important gap in college choice. There is no significant difference in odds of attending a private institution for individuals whose parents did not graduate high school and those who have at least one parent who graduated high school. However, individuals with parents educated beyond the high school level have lower odds of choosing the private sector. All other variables being held constant, for model 1, having a parent who did some college or graduated college decreases the odds of attending the private sector by factors of 0.81 and 0.69, respectively, when compared to one's most educated parent having graduated high school.

There is no difference in sector choice for higher education based on the birth cohort of an individual. Similar to both other countries, being a female increases the odds of choosing the private sector by a factor of 1.15, all other variables being held constant.

	Model 1	Model 2
Quintile of per capita income		
Second	1.68*** (.214)	1.56*** (.201)
Third	2.07*** (.242)	1.81*** (.215)
Fourth	2.97*** (.333)	2.35*** (.271)
Highest	3.08*** (.343)	2.29*** (.263)
Parental education		
Less than High school graduate	1.01 (.071)	.99 (.071)
Some college	0.81** (.071)	0.83** (.073)
College graduate	0.69*** (.038)	0.70*** (.040)
Year of birth		
1988	.94 (.131)	.93 (.132)
1989	0.81* (.099)	0.80* (.098)
1990	.89 (.107)	.87 (.106)
1991	.87 (.103)	0.82* (.098)
1992	.9 (.106)	.86 (.103)
1993	.96 (.116)	.91 (.111)
1994	.98 (.127)	.93 (.124)
1995	1.06 (.146)	.99 (.138)
Gender		
Female	1.15*** (.051)	1.16*** (.052)
Region		Yes
Constant	1.10 (0.169)	1.90 (0.470)
Tjur's D	0.02	0.05

Table 8.3. Odds ratio of choosing the private sector for the Brazilian individual model

Note: Model 1 does not include dummies for regions, while model 2 does. Robust standard error clustered by household are provided in-between parenthesis.

The base for quintile of per capita income is the lowest, i.e. the 20 percent poorest households in the country. The base for parental education is high school graduation. The base for birth cohort is 1987 and the base for gender is male.

* p<0.1 ** p<0.05 *** p<0.01

_

In figures 8.9 to 8.12, the probabilities for each model are plotted, first by income quintile and second by parental education, for males born in 1991.

Figure 8.9 shows the probabilities of attending a private institution by income

quintile. It reflects the differences between income quintiles seen above, with an increase

in probabilities as income increases. The probability of attending a private institution is

around 0.48 for the lowest income quintile, and rises to around 0.74 for the fourth and highest income quintiles. It is interesting to note that the rise in probability is the steepest between the first and second income quintiles (from about 0.48 to 0.62), showing quite a lower probability of choosing the private sector for the poorest individuals. This is probably simply due to the cost of such an education, likely meaning that poor individuals who are not accepted to the public sector choose in high numbers not to attend higher education rather than attend a private institution.



Figure 8.9. Probability of choosing a private institution in Brazil for a male born in 1991 whose most educated parent graduated high school, by household income

Figure 8.10 displays the same probabilities for the second model, with the distributions across regions displayed with boxplots. Although the interquartile ranges for the four highest income quintiles do not exceed 0.1, the ranges for these quintiles spread

from 0.25 to 0.35, showing moderate regional variation. The third income quintile in particular has the widest range, with regions with the lowest probabilities of choosing the private sector not exceeding 0.5, while regions with the highest probabilities exceed 0.8. The first income quintile is an exception as it displays a wide interquartile range from 0.42 to 0.65, and a range from 0.3 to 0.7. This shows the relatively high regional variation in the probability of attending a private institution for these individuals. Outliers include regions with different economic backgrounds, including wealthy regions such as Rio and Paraiba as well as poor regions such as Piaui. This could reflect both higher availability of public institutions in wealthy regions, preferred by the wealthiest, or the lack of private institutions in poorer regions, restricting the choice sets of students.





Figures 8.11 and 8.12 show the probabilities of choosing a private institution by category of parental education for a male born in 1991. As seen in Table 8.3, it is evident in Figure 8.11 that the probabilities for the individuals whose most educated parent either did not finish high school or graduated high school are similar, around 0.66. The probabilities of attending a private institution decreases with higher educational parental background, at 0.62 for individuals whose most educated parent did some college and at 0.58 for individuals whose most educated parent graduated college. This is consistent with the current state of the Brazilian higher education system, where entry to public institutions is merit-based, thus favoring individuals with higher cultural capital.





Figure 8.12 reveals rather strong regional variation independently of parental education, with ranges exceeding 0.3 for all four categories of parental education. The highest probabilities of attending a private institution are observed for the two lowest categories of parental education, at more than 80 percent, while the lowest are observed for the two highest categories of parental education, at about 40 percent. This shows something of an important regional variation in college choice in Brazil.





Combined Model

Similar to the model for participation, the analysis of the combined model for college choice is based primarily on graphs, the logit table is provided in Appendix (Appendix Table 10). As seen in figures 8.13 and 8.14, the probabilities obtained in the

combined model are very similar to the ones obtained in the individual models, and trends across quintiles and categories of parental education are the same. This allows to base the comparison of college choice equity in these three systems on the combined model. Straight comparison of the three countries, however, must take into account the contexts of the systems in terms of public/private availability, especially since different types of institutions are not available in both sectors in the same proportions in all three countries and access criteria differ. However, the concept of equity, which is defined here as different students making the same choices and attending in similar numbers different types of institution, could still be relevant, when properly embedded in national contexts.

Figure 8.13 allows the comparison of the college choices available in the three countries as well as the differences in choices across household income quintiles. First, it is essential to note that Argentina overall has a lower enrollment in the private sector, with probabilities of enrollment across quintiles ranging from about 0.1 to about 0.25. In comparison, Chile and Brazil have more developed private sectors that enroll on average more than half of their respective student bodies.

In terms of equity across income quintiles, as seen by the differences between probabilities across quintiles, Chile is seen as particularly equitable. The probability of choosing a private institution is a little over 0.6 for all income quintiles, with very little variation. However, this should be put in the context of Chile's vocational institutions being private, meaning that private higher education in Chile is, at least in part, attractive to individuals from the lowest socio-economic backgrounds because of the short vocational programs it provides. Although Brazil seems to have a system similar to Chile in terms of overall private/public sector distribution, it displays more variation in probabilities across quintiles. The lowest quintile seems to favor equally the public and private sectors, while the highest quintile largely favors the private sector, with a probability of choosing a private institution rising to about 0.75. Argentina also displays some differences depending on the financial background of the individual, with a difference of about 0.15 in the probabilities of attending a private institution. Looking at equity through the difference between the highest and lowest probabilities for each country, Figure 8.13 shows that the most equitable country in term of college choice seems to be Chile and the least equitable seems to be Brazil, although Chile gains that equity from the context of its system and the university-only publicly subsidized sector. Additional differentiation between vocational and university education would be necessary to fully understand equity in college choice in these three countries.

Figure 8.13. Probability of choosing a private institution in all three countries for a male born in 1991 whose most educated parent graduated high school, by household income



Figure 8.14 allows to look at equity through the lens of cultural capital, as measured through parental education. Interestingly, Argentina is the only country where higher parental education leads to a higher probability of choosing the private sector, although this probability remains very low a little over 0.2. This shows a different dynamic, which is consistent with the late development of the private sector and its cost compared to the free open public sector. On the other hand, both Brazil and Chile have lower probabilities of choosing the private sector with higher parental education, most probably because of the strength academically of both their public sectors. The decrease of private sector choice with higher parental education is steeper in Chile, which is once again probably due to the fully private vocational sector. When looking at equity through the width of the gap between highest and lowest probabilities, opposite results to the one based on financial capital are obtained. In terms of cultural capital, Chile is the most inequitable, with a gap of about 0.2, followed by Brazil, with a gap of about 0.1, and then Argentina, with a gap of about 0.05.



Figure 8.14. Probability of choosing a private institution in all three countries for a male born in 1991 from the third quintile of household income, by parental education

Conclusion

This chapter shows the findings for the models of college choice for individuals who entered higher education. All the models have very low goodness of fit. As was discussed in the literature review, this is not surprising in view of the plethora of factors involved in the college choice decision. These include such hard to measure factors as friends' and family's influences, but data limitation precluded the addition of other variables in the models presented here. However, in an attempt to improve the models, interactions were added in all three individual models, including gender and income quintiles, gender and parental education, birth cohort and income quintile, birth cohort and parental education, gender and region, as well as birth cohort and region. These additions did not improve the goodness of fit, corroborating findings in the literature that students' socio-economic backgrounds might not have such an impact on college choice.

Overall, the individual and combined models agree that Argentina has a very different college choice set for individuals, with very little enrollment in private institutions. This is due to a system that met the massification challenge with open-access in its public institutions. On the other hand, Brazil and Chile saw the development of private higher education to accommodate increasing demand in the second half of the 20th century, and have today on average more students in the private sector.

When looking at the difference in college choice depending on the financial background of individuals, Brazil is the country with the biggest gap in probabilities between the lowest and highest income quintiles. It can be inferred that the participation in higher education of individuals from lowest quintiles is more dependent on getting a seat in the free public sector, while individuals from wealthier background can in larger numbers consider private institutions. Argentina is second to Brazil in terms of gap across income quintiles. If Argentina's open-access public system explains the low probabilities, it does not account for the difference in probabilities across quintiles – higher probabilities of choosing the private sector with higher incomes. In the wake of quality issues in the public system and with the blossoming of the private sector, individuals from the wealthiest households seem to be taking advantage of new, probably elitist, opportunities. Chile seems to be the most equitable, however, this result should be put in the context of its vocational sector being fully private and thus distinction beyond public/private is also important.

When looking at college choice through the lens of parental education, Chile displays the biggest gap, which is probably in large parts also explained by the fact that the vocational sector is private. However, coupled with findings above, it is interesting to see how crucial the cultural background is in Chile compared to the financial background. This must be, of course, linked to literature showing the impact of parents and friends in the choice of an institution.

The individual models also showed the regional variation within each country. Compared to the participation results, all three countries show more regional variability in the probability of choosing the private sector across income quintiles and categories of parental education. Results are also less homogeneous for all countries than what was observed for participation. This shows that location is fundamental when looking at college choice, probably as it is linked with availability, especially since the focus is on students living with their family. It also hints at the fact that inequity might be dependent on location. In general, Chile showed the least variation among regions across income quintiles and parental education categories – although it had quite a few outliers. Argentina showed the largest variation in both cases, showing that location is central in the college choice decision in this country.

9. RESULTS OF THE ATTRITION MODEL

This chapter presents the results obtained from running the survival analysis models of student attrition in higher education introduced in chapter 6. Results are presented focusing first on individual models and then on the combined model coupled with the comparison of the individual models, like has been done in the two previous chapters.

Individual Models

Chile

Table 9.1 shows the results of the discrete time hazard model for attrition in higher education for 18 to 24 years old living with their parents in Chile. The goodness of fit of the attrition models is assessed using the BIC statistics following the example set by Singer and Willet (2003). Similar to the previous models, the high BIC statistics indicate very low fit for both models. It shows that this model has difficulty properly predicting the observed values, which should definitely be seen as a limitation to this analysis. Coefficients are overall similar between the two models.

There is no significant difference in the odds ratio for the income quintiles, except for the fourth income quintile which is found in the first model to be statistically significantly different from the first income quintile. All other variables being kept constant, belonging to the fourth income quintile increases the odds of dropout by a factor of 1.27 when compared to belonging to the first income quintile. However, this difference is not significant in the second model. Parental education seems to be a better predictor of attrition hazard than income quintile. In both models, having less educated parents increases the odds of drop out. Indeed, having parents who did not graduate high school increases the odds of dropout by a factor of 1.36 when compared to having at least one parent who graduated high school, holding all other variables constant. On the contrary, the odds of dropout for individuals whose most educated parent graduated college are decreased by a factor of 0.50 when compared to those of individuals whose most educated parent graduated but are relatively similar to the ones in the second model. Interestingly, there is no significant difference in the odds of dropout for individuals whose most educated parent graduated parent graduated high school and individuals whose most educated parent did some college.

In both models, individuals born after 1990 have significantly lower odds of dropout than individuals born in 1987. This is simply due to the fact that they were in the higher education system for a smaller amount of time and therefore had less opportunities to drop out.

Finally, male and female have similar odds of dropout.

	Model 1	Model 2
Quintile of per capita income		
Second	.98 (.102)	.97 (.101)
Third	1.11 (.110)	1.06 (.107)
Fourth	1.27** (.123)	1.19* (.118)
Highest	.96 (.103)	.86 (.097)
Parental education	· · · · · · · · · · · · · · · · · · ·	~ /
Less than high school graduate	1.36*** (.089)	1.38*** (.091)
Some college	1.06 (.122)	1.08 (.125)
College graduate	0.50*** (.047)	0.52*** (.049)
Year of birth	, ,	~ /
1988	.82 (.108)	.81 (.107)
1989	.91 (.101)	.92 (.102)
1990	0.65*** (.074)	0.66*** (.075)
1991	0.62*** (.073)	0.63*** (.074)
1992	0.66*** (.08)	0.67*** (.082)
1993	0.46*** (.066)	0.47*** (.068)
1994	0.46*** (.086)	0.47*** (.088)
1995	0.42*** (.141)	0.43***(.146)
Gender		
Female	.95 (.054)	.94 (.054)
Academic Year		
1	0.05*** (.006)	0.06*** (.010)
2	0.06*** (.008)	0.07*** (.012)
3	0.04*** (.006)	0.05*** (.009)
4	0.03*** (.005)	0.04*** (.008)
5	0.04*** (.009)	0.05*** (.012)
6	0.06*** (.030)	0.07*** (.036)
Region		Yes
BIC	11,387	11,496

Table 9.1. Odds ratio of attrition for the Chilean individual model

Note: Model 1 does not include dummies for regions, while model 2 does. Robust standard error clustered by individual are provided in-between parenthesis. The discrete time hazard model includes one constant per academic year.

The base for quintile of per capita income is the lowest, i.e. the 20 percent poorest households in the country. The base for parental education is high school graduation. The base for birth cohort is 1987 and the base for gender is male.

* p<0.1 ** p<0.05 *** p<0.01

In the case of survival analysis, using graphs is a necessity to understand properly

how the hazard of attrition is playing out across academic years, information that is

difficult to get from the regression table. This information is displayed in figures 9.1 to 9.4.

Figure 9.1 represents the probability of attrition in academic years 1 to 6 for individuals belonging to the different wealth quintiles. Overall, it shows a low probability of attrition, ranging between 0.017 and 0.043. The probability increases between year 1 and 2, and then decreases steadily until year 4. It raises again in year 5 and 6. The difference in quintiles corroborates what was detected in Table 9.1, that is little difference in attrition between income quintile. Interestingly, individuals from the third and fourth income quintiles are the most at risk of attrition, meaning that individuals in the middle class have the highest hazard to drop out before completing higher education, although their probabilities are not significantly different from individuals in other income quintiles.



Figure 9.1. Probability of attrition from higher education in Chile for a male born in 1991 whose most educated parent graduated high school, by household income

Figure 9.2 similarly displays by income quintile the probability of attrition, according to model 2, and plots regional variation using boxplots. In general, there is little regional variation, with ranges not exceeding 0.01. Somewhat higher variation can be seen for the third income quintile in the two last academic years, where attrition seems more influenced by location. Additionally, the attrition hazard for the highest income quintile seems to be more dependent on location for the first and second academic years, with ranges of about 0.02. It is interesting to note quite an important number of outliers, with the three northernmost regions in Chile having consistently higher attrition levels.



Figure 9.2. Probability of attrition from higher education in Chile for a male born in 1991 whose most educated parent graduated high school, by household income over regions

Figure 9.3 displays the results of model 1 by categories of parental education, for a male born in 1991 in the third household income quintile. Unsurprisingly, individuals with less educated parents are the most likely to drop out, while individuals with at least one parent who graduated college are the least likely to drop out. In particular, in years 1 to 4, individuals with parents who graduated college have statistically significantly lower probabilities of attrition than their peers with less educated parents. Although small and non-significant, the difference between individuals whose most educated parent did some college and those whose most educated parents finished high school is surprising, as the former have a higher hazard of attrition. This should be investigated further with bigger samples for students with parents who did not complete college, in order to determine whether having a parent who dropped out - either from high school or college - increases the chances of attrition in Chile.

Figure 9.3. Probability of attrition from higher education in Chile for a male born in 1991

from the third quintile of household income, by parental education τ. 80

Similar to what was done above, Figure 9.4 displays the hazard of attrition for model 2 and includes regional variation in the form of boxplots. Like before, little variation is observed in attrition hazard among regions overall, although the same three regions as in Figure 9.2 are consistent outliers. Somewhat higher variation is observed for individuals whose most educated parent graduated high school for years 4 and 5, but the variation is still small in range. Chile seems overall quite homogeneous in the probability of attrition geographically.





Figure 9.4. Probability of attrition from higher education in Chile for a male born in 1991 from the third quintile of household income, by parental education and over regions

Argentina

The results for both models with and without regions for Argentina are presented in Table 9.2. As for the Chilean model, the goodness of fit is low with very high BIC statistics for both models. Income quintiles and parental education do not seem to be good predictors of the attrition hazard in Argentina and Chile. The BIC statistics also indicate little difference between the two models, with a preference for the one without regions which has the lowest statistic.

First, it is important to note that in both models 1 and 2, there is no statistically significant difference in odds of attrition depending on the household income quintile. This is somewhat similar to what was found in Chile. However, an interesting

observation stems from the fact that individuals from wealthier background seem to have higher odds of attrition.

On the other hand, parental education seems to be a statistically significant predictor of attrition in these models. Like in Chile, the more parents are educated the lower the odds of attrition of their offspring. Keeping all other variables constant, having parents who did not graduate high school increases the odds of attrition by a factor of 1.71 compared to having at least one parent who graduated high school. On the contrary, having a parent who did some college or graduated college decreases the odds of attrition by factors of 0.74 and 0.49, respectively, when compared to having a high school graduate as most educated parent.

In both models, individuals born after 1991 have significantly lower odds of attrition than individuals born in 1987. As was the case for Chile, this is probably due to the fact that they have spent less time in the higher education system.

An important difference with Chile is that there is a statistically significant difference in odds between genders. All other variables being kept constant, being female decreases the odds of attrition by a factor of 0.67.

uintile of per capita income Second .96 (.114) .96 (.115) Third 1.05 (.119) 1.04 (.120) Fourth 1.08 (.126) 1.04 (.125) Highest 1.26* (.155) 1.19 (.154) arental education 1.26* (.155) 1.19 (.154) Less than high school graduate 1.71*** (.147) 1.69*** (.147) Some college 0.74*** (.082) 0.75** (.085) College graduate 0.49*** (.049) 0.51*** (.051) ear of birth 1.04 (.130) 1.04 (.130) 1988 .78 (.119) 0.78* (.120) 1989 1.04 (.130) 1.04 (.130) 1990 .86 (.110) .86 (.111) 1991 0.72** (.097) 0.71** (.096) 1992 0.63*** (.091) 0.61*** (.088) 1993 0.67** (.106) 0.66*** (.106) 1994 0.61** (.128) 0.60** (.128) 1995 0.39*** (.045) 0.67*** (.045) cademic Year 1 0.03*** (.007) 0.04*** (.010) 1 0.03*** (Model 1	Model 2
Second .96 (.114) .96 (.115) Third 1.05 (.119) 1.04 (.120) Fourth 1.08 (.126) 1.04 (.125) Highest 1.26* (.155) 1.19 (.154) arental education 1.26* (.155) 1.19 (.154) Less than high school graduate 1.71*** (.147) 1.69*** (.147) Some college 0.74*** (.082) 0.75** (.085) College graduate 0.49*** (.049) 0.51*** (.051) ear of birth 104 (.130) 1.04 (.130) 1988 .78 (.119) 0.78* (.120) 1989 1.04 (.130) 1.04 (.130) 1990 .86 (.110) .86 (.111) 1991 0.72** (.097) 0.71** (.096) 1992 0.63*** (.091) 0.61*** (.088) 1993 0.67** (.106) 0.66*** (.106) 1994 0.61** (.128) 0.60** (.128) 1995 0.39*** (.045) 0.67*** (.045) cademic Year 1 0.03*** (.007) 0.4**** (.010) 1 0.03*** (.010) 0.06**** (.015) 0.06**** (Quintile of per capita income		
Third $1.05(.119)$ $1.04(.120)$ Fourth $1.08(.126)$ $1.04(.125)$ Highest $1.26*(.155)$ $1.19(.154)$ arental education $1.26*(.155)$ $1.19(.154)$ Less than high school graduate $1.71***(.147)$ $1.69***(.147)$ Some college $0.74***(.082)$ $0.75**(.085)$ College graduate $0.49***(.049)$ $0.51***(.051)$ ear of birth 1.988 $.78(.119)$ $0.78*(.120)$ 1988 $.78(.119)$ $0.78*(.120)$ 1989 $1.04(.130)$ $1.04(.130)$ 1990 $.86(.110)$ $.86(.111)$ 1991 $0.72**(.097)$ $0.71**(.096)$ 1992 $0.63***(.091)$ $0.61***(.088)$ 1993 $0.67**(.106)$ $0.66***(.106)$ 1994 $0.61**(.128)$ $0.60**(.128)$ 1995 $0.39***(.130)$ $0.38***(.128)$ ender $Female$ $0.67***(.045)$ $0.67***(.045)$ C $0.06***(.010)$ $0.06***(.010)$ $0.06***(.012)$ 6 $0.03***(.010)$ $0.03***(.012)$ $0.03***(.012)$ 6 $0.03***(.018)$ $0.03***(.012)$	Second	.96 (.114)	.96 (.115)
Fourth $1.08(126)$ $1.04(125)$ Highest $1.26*(.155)$ $1.19(.154)$ arental education $1.26*(.155)$ $1.19(.154)$ Less than high school graduate $1.71***(.147)$ $1.69***(.147)$ Some college $0.74***(.082)$ $0.75**(.085)$ College graduate $0.49***(.049)$ $0.51***(.051)$ ear of birth $1.04(.130)$ $1.04(.130)$ 1988 $.78(.119)$ $0.78*(.120)$ 1989 $1.04(.130)$ $1.04(.130)$ 1990 $.86(.110)$ $.86(.111)$ 1991 $0.72**(.097)$ $0.71**(.096)$ 1992 $0.63***(.091)$ $0.61***(.088)$ 1993 $0.67**(.106)$ $0.66***(.106)$ 1994 $0.61**(.128)$ $0.60***(.128)$ 1995 $0.39***(.130)$ $0.38***(.128)$ ender $Female$ $0.67***(.045)$ $0.67***(.045)$ C $0.06***(.010)$ $0.03***(.010)$ $0.03***(.015)$ 5 $0.04***(.010)$ $0.03***(.018)$ $0.03***(.018)$ 1001 $0.03***(.018)$ $0.03***(.018)$ $0.03***(.018)$	Third	1.05 (.119)	1.04 (.120)
Highest 1.26* (.155) 1.19 (.154) arental education 1.26* (.155) 1.19 (.154) Less than high school graduate 1.71*** (.147) 1.69*** (.147) Some college 0.74*** (.082) 0.75** (.085) College graduate 0.49*** (.049) 0.51*** (.051) ear of birth 1.04 (.130) 1.04 (.130) 1988 .78 (.119) 0.78* (.120) 1989 1.04 (.130) 1.04 (.130) 1990 .86 (.110) .86 (.111) 1991 0.72** (.097) 0.71** (.096) 1992 0.63*** (.091) 0.61*** (.088) 1993 0.67** (.106) 0.66*** (.106) 1994 0.61** (.128) 0.60** (.128) 1995 0.39*** (.130) 0.38*** (.128) ender - - Female 0.67*** (.045) 0.67*** (.045) cademic Year - - 1 0.03*** (.010) 0.04*** (.010) 3 0.06*** (.010) 0.05*** (.015) 4 0.06*** (.010) 0.05*** (.015) 5 0.04*** (.010) 0.03*** (.	Fourth	1.08 (.126)	1.04 (.125)
arental education 1.71*** (.147) 1.69*** (.147) Less than high school graduate 0.74*** (.082) 0.75** (.085) Some college 0.49*** (.049) 0.51*** (.051) ear of birth 1 0.78* (.120) 1988 .78 (.119) 0.78* (.120) 1989 1.04 (.130) 1.04 (.130) 1990 .86 (.110) .86 (.111) 1991 0.72** (.097) 0.71** (.096) 1992 0.63*** (.091) 0.61*** (.088) 1993 0.67** (.106) 0.66*** (.106) 1994 0.61** (.128) 0.60** (.128) 1995 0.39*** (.130) 0.38*** (.128) ender - - Female 0.67*** (.045) 0.67*** (.045) 1 0.03*** (.007) 0.04*** (.010) 3 0.06*** (.010) 0.06*** (.010) 4 0.06*** (.010) 0.05*** (.015) 5 0.04*** (.010) 0.04*** (.012) 6 0.03*** (.018) 0.03*** (.018) egion Yes	Highest	1.26* (.155)	1.19 (.154)
Less than high school graduate $1.71^{***}(.147)$ $1.69^{***}(.147)$ Some college $0.74^{***}(.082)$ $0.75^{**}(.085)$ College graduate $0.49^{***}(.049)$ $0.51^{***}(.051)$ ear of birth 104 $0.49^{***}(.049)$ $0.51^{***}(.051)$ 1988 $.78(.119)$ $0.78^{*}(.120)$ 1989 $1.04(.130)$ $1.04(.130)$ 1990 $.86(.110)$ $.86(.111)$ 1991 $0.72^{**}(.097)$ $0.71^{**}(.096)$ 1992 $0.63^{***}(.091)$ $0.61^{***}(.088)$ 1993 $0.67^{**}(.106)$ $0.66^{***}(.106)$ 1994 $0.61^{**}(.128)$ $0.60^{**}(.128)$ 1995 $0.39^{***}(.045)$ $0.67^{***}(.045)$ cademic Year 1 $0.03^{***}(.005)$ $0.03^{***}(.007)$ 2 $0.04^{***}(.010)$ $0.06^{***}(.015)$ 4 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 5 $0.04^{***}(.010)$ $0.03^{***}(.018)$ 6 $0.03^{***}(.018)$ $0.03^{***}(.018)$ egion $$ Yes	Parental education	· · · · · · · · · · · · · · · · · · ·	
Some college 0.74^{***} (.082) 0.75^{**} (.085)College graduate 0.49^{***} (.049) 0.51^{***} (.051)ear of birth 1988 $.78$ (.119) 0.78^{*} (.120)1989 1.04 (.130) 1.04 (.130)1990 $.86$ (.110) $.86$ (.111)1991 0.72^{**} (.097) 0.71^{**} (.096)1992 0.63^{***} (.091) 0.61^{***} (.088)1993 0.67^{**} (.106) 0.66^{***} (.106)1994 0.61^{**} (.128) 0.60^{**} (.128)1995 0.39^{***} (.130) 0.38^{***} (.128)ender $Female$ 0.67^{***} (.045) 0.67^{***} (.045)cademic Year 1 0.03^{***} (.007) 0.04^{***} (.010)3 0.06^{***} (.010) 0.05^{***} (.015)4 0.04^{***} (.010) 0.04^{***} (.012)6 0.03^{***} (.018) 0.03^{***} (.018)egion $$ Yes	Less than high school graduate	1.71*** (.147)	1.69*** (.147)
College graduate $0.49***(.049)$ $0.51***(.051)$ ear of birth $0.49***(.049)$ $0.51***(.051)$ 1988 $.78(.119)$ $0.78*(.120)$ 1989 $1.04(.130)$ $1.04(.130)$ 1990 $.86(.110)$ $.86(.111)$ 1991 $0.72**(.097)$ $0.71**(.096)$ 1992 $0.63***(.091)$ $0.61***(.088)$ 1993 $0.67**(.106)$ $0.66***(.106)$ 1994 $0.61**(.128)$ $0.60**(.128)$ 1995 $0.39***(.130)$ $0.38***(.128)$ ender $0.67**(.045)$ $0.67***(.045)$ Female $0.67***(.007)$ $0.04***(.007)$ 2 $0.04***(.007)$ $0.04***(.010)$ 3 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 4 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 5 $0.04^{***}(.018)$ $0.03^{***}(.018)$ egion $$ YesIC 8.640 8.852	Some college	0.74*** (.082)	0.75** (.085)
ear of birth1988.78 (.119) 0.78^* (.120)19891.04 (.130)1.04 (.130)1990.86 (.110).86 (.111)1991 0.72^{**} (.097) 0.71^{**} (.096)1992 0.63^{***} (.091) 0.61^{***} (.088)1993 0.67^{**} (.106) 0.66^{***} (.106)1994 0.61^{**} (.128) 0.60^{**} (.128)1995 0.39^{***} (.130) 0.38^{***} (.128)enderFemale 0.67^{***} (.045) 0.67^{***} (.045)cademic Year1 0.03^{***} (.007) 0.04^{***} (.010)3 0.06^{***} (.010) 0.05^{***} (.015)4 0.06^{***} (.010) 0.05^{***} (.015)5 0.04^{***} (.010) 0.04^{***} (.012)6 0.03^{***} (.018) 0.03^{***} (.018)egionYesIC 8.640 8.852	College graduate	0.49*** (.049)	0.51*** (.051)
1988.78 (.119) $0.78* (.120)$ 19891.04 (.130)1.04 (.130)1990.86 (.110).86 (.111)1991 $0.72** (.097)$ $0.71** (.096)$ 1992 $0.63*** (.091)$ $0.61*** (.088)$ 1993 $0.67** (.106)$ $0.66*** (.106)$ 1994 $0.61** (.128)$ $0.60** (.128)$ 1995 $0.39*** (.130)$ $0.38*** (.128)$ ender $Female$ $0.67*** (.045)$ $0.67*** (.045)$ 2 $0.04*** (.007)$ $0.04*** (.010)$ 3 $0.06^{***} (.010)$ $0.06^{***} (.015)$ 4 $0.06^{***} (.010)$ $0.05^{***} (.015)$ 5 $0.04*** (.010)$ $0.04*** (.012)$ 6 $0.03^{***} (.018)$ $0.03*** (.018)$ egion $$ Yes	Year of birth		
1989 $1.04(.130)$ $1.04(.130)$ 1990.86(.110).86(.111)1991 $0.72^{**}(.097)$ $0.71^{**}(.096)$ 1992 $0.63^{***}(.091)$ $0.61^{***}(.088)$ 1993 $0.67^{**}(.106)$ $0.66^{***}(.106)$ 1994 $0.61^{**}(.128)$ $0.60^{**}(.128)$ 1995 $0.39^{***}(.130)$ $0.38^{***}(.128)$ ender $Female$ $0.67^{***}(.045)$ $0.67^{***}(.045)$ cademic Year $0.03^{***}(.007)$ $0.04^{***}(.007)$ 2 $0.04^{***}(.007)$ $0.04^{***}(.010)$ 3 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 4 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 5 $0.04^{***}(.018)$ $0.03^{***}(.018)$ egionYesIC 8.640 8.852	1988	.78 (.119)	0.78* (.120)
1990.86 (.110).86 (.11)1991 $0.72^{**}(.097)$ $0.71^{**}(.096)$ 1992 $0.63^{***}(.091)$ $0.61^{***}(.088)$ 1993 $0.67^{**}(.106)$ $0.66^{***}(.106)$ 1994 $0.61^{**}(.128)$ $0.60^{**}(.128)$ 1995 $0.39^{***}(.130)$ $0.38^{***}(.128)$ ender $0.67^{***}(.045)$ $0.67^{***}(.045)$ Female $0.67^{***}(.045)$ $0.67^{***}(.045)$ cademic Year $0.03^{***}(.007)$ $0.04^{***}(.007)$ 2 $0.04^{***}(.007)$ $0.04^{***}(.010)$ 3 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 4 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 5 $0.04^{***}(.010)$ $0.03^{***}(.018)$ egionYesIC 8.640 8.852	1989	1.04 (.130)	1.04 (.130)
1991 $0.72^{**}(.097)$ $0.71^{**}(.096)$ 1992 $0.63^{***}(.091)$ $0.61^{***}(.088)$ 1993 $0.67^{**}(.106)$ $0.66^{***}(.106)$ 1994 $0.61^{**}(.128)$ $0.60^{**}(.128)$ 1995 $0.39^{***}(.130)$ $0.38^{***}(.128)$ ender $0.67^{***}(.045)$ $0.67^{***}(.045)$ Female $0.67^{***}(.045)$ $0.67^{***}(.045)$ cademic Year $0.03^{***}(.007)$ $0.04^{***}(.010)$ 3 $0.06^{***}(.010)$ $0.06^{***}(.010)$ 4 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 5 $0.04^{***}(.010)$ $0.03^{***}(.012)$ 6 $0.03^{***}(.018)$ $0.03^{***}(.018)$ egionYes	1990	.86 (.110)	.86 (.111)
1992 $0.63^{***}(.091)$ $0.61^{***}(.088)$ 1993 $0.67^{**}(.106)$ $0.61^{***}(.106)$ 1994 $0.61^{**}(.128)$ $0.60^{**}(.128)$ 1995 $0.39^{***}(.130)$ $0.38^{***}(.128)$ ender $0.67^{***}(.045)$ $0.67^{***}(.045)$ Female $0.67^{***}(.045)$ $0.67^{***}(.045)$ cademic Year $0.03^{***}(.007)$ $0.04^{***}(.007)$ 2 $0.04^{***}(.007)$ $0.04^{***}(.010)$ 3 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 4 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 5 $0.04^{***}(.010)$ $0.04^{***}(.012)$ 6 $0.03^{***}(.018)$ $0.03^{***}(.018)$ egionYesIC 8.640 8.852	1991	0.72** (.097)	0.71** (.096)
1993 $0.67^{**} (.106)$ $0.66^{***} (.106)$ 1994 $0.61^{**} (.128)$ $0.60^{**} (.128)$ 1995 $0.39^{***} (.130)$ $0.38^{***} (.128)$ ender $0.67^{***} (.045)$ $0.67^{***} (.045)$ Female $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.67^{***} (.045)$ $0.04^{***} (.007)$ $0.04^{***} (.010)$ $0.06^{***} (.010)$ $0.04^{***} (.010)$ $0.04^{***} (.010)$ $0.03^{***} (.018)$ $0.03^{***} (.018)$ $0.03^{***} (.018)$ $0.03^{***} (.018)$ $0.03^{***} (.018)$ $0.03^{***} (.018)$ $0.03^{***} (.018)$ $0.03^{***} (.018)$ $0.03^{***} (.018)$ $0.03^{***} (.018)$	1992	0.63*** (.091)	0.61*** (.088)
1994 $0.61^{**}(.128)$ $0.60^{**}(.128)$ 1995 $0.39^{***}(.130)$ $0.38^{***}(.128)$ ender $0.67^{***}(.045)$ $0.67^{***}(.045)$ Female $0.67^{***}(.045)$ $0.67^{***}(.045)$ cademic Year 1 $0.03^{***}(.005)$ $0.03^{***}(.007)$ 2 $0.04^{***}(.007)$ $0.04^{***}(.010)$ 3 $0.06^{***}(.010)$ $0.06^{***}(.015)$ 4 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 5 $0.04^{***}(.010)$ $0.04^{***}(.012)$ 6 $0.03^{***}(.018)$ $0.03^{***}(.018)$ egionYesIC 8.640 8.852	1993	0.67** (.106)	0.66*** (.106)
1995 $0.39***(.130)$ $0.38***(.128)$ ender $0.67***(.045)$ $0.67***(.045)$ Female $0.67***(.045)$ $0.67***(.045)$ cademic Year $0.03***(.005)$ $0.03***(.007)$ 2 $0.04***(.007)$ $0.04***(.010)$ 3 $0.06***(.010)$ $0.06***(.010)$ 4 $0.06***(.010)$ $0.05***(.015)$ 5 $0.04***(.010)$ $0.03***(.015)$ 6 $0.03***(.018)$ $0.03***(.018)$ egionYesIC 8.640 8.852	1994	0.61** (.128)	0.60** (.128)
ender 0.67*** (.045) 0.67*** (.045) Female 0.67*** (.045) 0.67*** (.045) cademic Year 0.03*** (.005) 0.03*** (.007) 2 0.04*** (.007) 0.04*** (.010) 3 0.06*** (.010) 0.06*** (.015) 4 0.06*** (.010) 0.05*** (.015) 5 0.04*** (.010) 0.04*** (.012) 6 0.03*** (.018) 0.03*** (.018) egion Yes IC 8.640 8.852	1995	0.39*** (.130)	0.38*** (.128)
Female 0.67*** (.045) 0.67*** (.045) cademic Year 0.03*** (.005) 0.03*** (.007) 2 0.04*** (.007) 0.04*** (.010) 3 0.06*** (.010) 0.06*** (.015) 4 0.06*** (.010) 0.05*** (.015) 5 0.04*** (.010) 0.04*** (.012) 6 0.03*** (.018) 0.03*** (.018) egion Yes IC 8.640 8.852	Gender		· · · · · · · · · · · · · · · · · · ·
cademic Year 1 0.03*** (.005) 0.03*** (.007) 2 0.04*** (.007) 0.04*** (.010) 3 0.06*** (.010) 0.06*** (.015) 4 0.06*** (.010) 0.05*** (.015) 5 0.04*** (.010) 0.04*** (.012) 6 0.03*** (.018) 0.03*** (.018) egion Yes IC 8.640 8.852	Female	0.67*** (.045)	0.67*** (.045)
1 $0.03^{***}(.005)$ $0.03^{***}(.007)$ 2 $0.04^{***}(.007)$ $0.04^{***}(.010)$ 3 $0.06^{***}(.010)$ $0.06^{***}(.015)$ 4 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 5 $0.04^{***}(.010)$ $0.04^{***}(.012)$ 6 $0.03^{***}(.018)$ $0.03^{***}(.018)$ egionYesIC 8.640 8.852	Academic Year		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1	0.03*** (.005)	0.03*** (.007)
3 0.06*** (.010) 0.06*** (.015) 4 0.06*** (.010) 0.05*** (.015) 5 0.04*** (.010) 0.04*** (.012) 6 0.03*** (.018) 0.03*** (.018) egion Yes IC 8.640 8.852	2	0.04*** (.007)	0.04*** (.010)
4 $0.06^{***}(.010)$ $0.05^{***}(.015)$ 5 $0.04^{***}(.010)$ $0.04^{***}(.012)$ 6 $0.03^{***}(.018)$ $0.03^{***}(.018)$ egionYesIC 8.640 8.852	3	0.06*** (.010)	0.06*** (.015)
5 $0.04^{***}(.010)$ $0.04^{***}(.012)$ 6 $0.03^{***}(.018)$ $0.03^{***}(.018)$ egionYesIC 8.640 8.852	4	0.06*** (.010)	0.05*** (.015)
6 0.03*** (.018) 0.03*** (.018) egion Yes IC 8.640 8.852	5	0.04*** (.010)	0.04*** (.012)
egion Yes IC 8.640 8.852	6	0.03*** (.018)	0.03*** (.018)
IC 8.640 8.852	Region		Yes
-,	BIC	8,640	8,852

Table 9.2. Odds ratio of attrition for the Argentinian individual model

Note: Model 1 does not include dummies for regions, while model 2 does. Robust standard error clustered by individual are provided in-between parenthesis. The discrete time hazard model includes one constant per academic year.

The base for quintile of per capita income is the lowest, i.e. the 20 percent poorest households in the country. The base for parental education is high school graduation. The base for birth cohort is 1987 and the base for gender is male.

* p<0.1 ** p<0.05 *** p<0.01

Like in the prior models for Chile, this dissertation includes graphs to better comprehend the discrete time hazard model and see the difference in hazard throughout time. Figures 9.5 to 9.8 illustrate models 1 and 2 for Brazil.

Figure 9.5 displays the hazard rates throughout the academic years for a male born in 1991 whose most educated parent graduated high school, depending on the income quintile they belong to. First, the hazard rate is similar to Chile and range from 0.02 to 0.055. The hazard rate increases from year 1 to year 3, and then decreases to year 6. It is a trend dissimilar to what was observed in Chile. As observed in Table 9.2, the difference between income quintiles is small and not significant. However, the wealth relationship to attrition is not straightforward, with the richest individuals having the highest probability to drop out.

Figure 9.5. Probability of attrition from higher education in Argentina for a male born in 1991 whose most educated parent graduated high school, by household income



Figure 9.6 displays the same graph for model 2 and includes the variability across region. As was the case for Chile, small variations are observed between regions in general, with ranges mostly smaller than 0.05. Higher variation is detected for the lowest income quintile in years 3 and 4 – showing that attrition is somewhat higher at that point in time in some regions, as well as for the third income quintile in year 3 – where some regions keep lower attrition probabilities. The little variation observed in years 5 and 6 across all quintiles is probably due to the lack of data in some regions.

Figure 9.6. Probability of attrition from higher education in Argentina for a male born in 1991 whose most educated parent graduated high school, by household income over regions



Figure 9.7 shows the probability of attrition by categories of parental education, and displays a gap in probabilities depending on the individual's cultural capital. The hierarchy is respected with individuals with less educated parents having a higher risk to drop out, while individuals with the most educated parents have lower probabilities of attrition. The difference between years is also more pronounced for individuals with less educated parents compared to others, with probabilities throughout the academic years ranging from about 0.035 in year 1 to about 0.075 in year 3. This category of individuals has significantly higher probabilities of attrition than all three others in years 1 to 3. On the other extreme, individuals whose most educated parent graduated college have significantly lower odds of attrition than those individuals whose most educated parent graduated parent graduated high school in years 1 to 4.





Finally, in Figure 9.8, the probabilities of attrition by categories of parental education are displayed as predicted by model 2, with regional variation represented

through the use of boxplots. This presents more important regional variations in Argentina depending on the region than what has been observed before. It is especially true for students whose parent did not graduate high school, with interquartile ranges ranging from 0.025 to 0.06. Overall regional variation is small for the other categories, and particularly for the individuals whose most educated parent graduated college. It seems that in Argentina, the region one lives in makes an important difference for the poorest students.



Figure 9.8. Probability of attrition from higher education in Argentina for a male born in 1991 from the third quintile of household income, by parental education and over regions

Brazil

Finally, the third individual models, for Brazil, are presented in Table 9.3. As was the case for both countries above, the models proposed constitute weak fits for the
data, with BIC statistics exceeding 8,000 for both models. Differences between model 1 and model 2 can be observed mostly in terms of the odds ratio for income quintiles and the baseline hazard model (as shown by the constant for each academic year). This will be further commented on below.

First, concerning income quintiles, there is only one significant difference in odds of attrition between individuals from the poorest background and individuals from the third income quintile: in model 1, the latter have 1.52 times higher odds to drop out. However, this significant result is not replicated in the model with regions. Interestingly, in both models the highest difference in odds of attrition compared to individuals from the poorest income quintile are observed for individuals from the third income quintile, and the second highest difference is with individuals from the fourth income quintile.

Contrarily to what is observed in Chile and Argentina, there is no statistically significance difference in odds of attrition between individuals whose parents did not graduate high school and those who have at least one parent who graduated high school. However, individuals from more educated backgrounds have, like in Argentina, lower odds of attrition. Keeping all other variables constant, having a parent who did some college and graduated college decreases the odds of attrition by factors of 0.76 and 0.67, respectively, when compared to having a high school graduate as most educated parent, according to model 1.

Brazil also shows a difference in the odds of attrition depending on birth cohorts. 1990, 1991, and 1992 cohorts have significantly lower odds of drop out than the 1987 cohort. However, there is no significant difference in odds of attrition in both models

196

between the 1987 cohort and cohorts born after 1993. This difference might be due to smaller cohorts in the sample of this study.

Finally, like in Argentina, being female decreases the odds of drop out by a factor of 0.67 in both models, when keeping all other variables constant.

Brazil is the only country in which the addition of the region variable changes importantly the odds of the baseline hazard model. For all academic years, it doubles the intercept, i.e. the odds of attrition for a male born in 1987 belonging to the poorest income quintile, whose most educated parent graduated high school, and living in the base region. However, the BIC statistics indicate that the model without region is a better fit to the data. Of interest, also, is the fact that these intercepts are higher than in both Chile and Argentina, indicating overall higher odds of attrition in Brazil.

	Model 1	Model 2
Quintile of per capita income		
Second	1.28 (.279)	1.19 (.262)
Third	1.52** (.306)	1.37 (.278)
Fourth	1.39* (.270)	1.20 (.236)
Highest	1.13 (.220)	.94 (.186)
Parental education		
Less than high school graduate	1.11 (.106)	1.11 (.105)
Some college	0.76** (.097)	0.76** (.098)
College graduate	0.67*** (.057)	0.68*** (.058)
Year of birth		
1988	.82 (.136)	.82 (.137)
1989	.88 (.129)	.88 (.129)
1990	0.71** (.104)	0.71** (.105)
1991	0.72** (.104)	0.71** (.106)
1992	0.68** (.103)	0.67*** (.103)
1993	.83 (.134)	.82 (.134)
1994	.86 (.160)	.86 (.162)
1995	0.65* (.17)	0.63* (.165)
Gender		· · · ·
Female	0.67*** (.045)	0.67*** (.045)
Academic Year		
1	0.04*** (.009)	0.07*** (.023)
2	0.05*** (.012)	0.10*** (.031)
3	0.08*** (.018)	0.16*** (.051)
4	0.06*** (.016)	0.13*** (.042)
5	0.14*** (.036)	0.28*** (.096)
6	0.21*** (.069)	0.41** (.166)
Region		Yes
BIC	8,273	8,466

Table 9.3. Odds ratio of attrition for the Brazilian individual model

Note: Model 1 does not include dummies for regions, while model 2 does. Robust standard error clustered by individual are provided in-between parenthesis. The discrete time hazard model includes one constant per academic year.

The base for quintile of per capita income is the lowest, i.e. the 20 percent poorest households in the country. The base for parental education is high school graduation. The base for birth cohort is 1987 and the base for gender is male.

* p<0.1 ** p<0.05 *** p<0.01

As was the case for both countries before, the analysis continues using mainly

graphs. Figure 9.9 graphs the probabilities throughout the academic years and by income

quintile. As observed in Table 9.3, the probabilities are higher overall than for Chile and Argentina, ranging from about 0.02 to about 0.18. The overall trend is upwards with the academic years, meaning higher probabilities of attrition the more advanced an individual is in their studies. The only exception is the fourth year, where a small drop is observed consistent with the fact that 4 year is the normal time-to-degree for a Bachelor degree in Brazil (Monroy & Clark, 2012). The lowest probability is observed for year 1 and the highest for year 6. The difference between the lowest and highest probabilities is particularly striking when compared to Chile and Argentina.

The difference between income quintiles displayed in Figure 9.9 is quite small, although it increases with the years. Overall, individuals from different income quintiles have similar probabilities of attrition.

Figure 9.9. Probability of attrition from higher education in Brazil for a male born in 1991 whose most educated parent graduated high school, by household income



On Figure 9.10, the same probabilities are displayed but this time using model 2 and displaying the regional variation. There is overall little variation between regions in Brazil when looking at the probabilities per income quintile. The regional variation is however not homogeneous for different income quintiles throughout the years. A somewhat higher regional variation is observed in year 3 for the lowest income quintile, while for the three wealthiest income quintiles higher variation is observed in years 5 and 6. This shows that location affects differently and at different times in their higher education career individuals from different income quintiles. Outliers with higher attrition consistently include the region of São Paulo, which could be due to higher participation in the first instance that is not followed by completion and/or to the larger number of people surveyed in this region by the PNAD. *Figure 9.10.* Probability of attrition from higher education in Brazil for a male born in 1991 whose most educated parent graduated high school, by household income over regions



Figure 9.11 is the equivalent of Figure 9.9 except for categories of parental education. It shows no significant difference between categories of parental education across academic years. There is a larger gap between categories of parental education, when compared to income quintiles. Like in Argentina and Chile, the hierarchy is respected with individuals from less educated backgrounds being more likely to drop out, however unlike in Chile and Argentina, this graph displays no statistically significant difference.



Figure 9.11. Probability of attrition from higher education in Brazil for a male born in 1991 from the third quintile of household income, by parental education

Figure 9.12 presents model 2 by categories of parental education with the regional variation displayed through boxplots. Regional variation is more pronounced here than in Figure 9.10, particularly for the probabilities of individuals whose parents did not graduate high school. This is similar to Argentina, where individuals from less educated backgrounds are more dependent on the region where they live. Overall in Brazil, there is also more regional variation in the odds of attrition in years 3 and 4 compared to year 1 and 2, throughout all income quintiles. It shows that location is important as students get close to the average time of completion of higher education. As was the case before, outliers with higher participation include the state of São Paulo, but also, in this case, the state of Piaui – one of the poorest states in the country.



Figure 9.12. Probability of attrition from higher education in Brazil for a male born in 1991 from the third quintile of household income, by parental education and over regions

Combined Model

As in both previous chapter, the results of the combined models are analyzed through graphs. The regression table can be found in appendix (Appendix Table 11). The probabilities obtained with the combined model are similar to the ones in the individual models shown above, thus indicating the appropriateness of the combined model for comparison.

Figure 9.13 indicates the probability of attrition across academic years for a male born in 1991 whose most educated parent graduated high school by country and by income quintile. In year 1, Chile has a significantly higher probability of attrition than Argentina for all incomes, except the wealthiest where the difference is not significant. In year 2, Chile and Argentina have similar attrition probabilities, except for the third income quintile where Chilean individuals have significantly higher attrition probabilities. In year 3 and 4, Argentina and Chile have similar attrition probabilities again, except for the wealthiest income quintile where Argentinian students have significantly higher attrition probabilities. In years 5 and 6, the attrition probabilities for these two countries are not significantly different.

In years 1 and 2, Brazil is overall not significantly different from either Argentina or Chile, except for the third income quintile where its probabilities are significantly higher in both years and for the fourth quintile where its probabilities are significantly higher in year 1. In years 3 and 4, except for the poorest income quintile where there is no significant difference between the three countries, Brazil consistently has significantly higher attrition probabilities than Chile. These probabilities are also statistically significantly higher than Argentinian ones in year 3 for individuals in the third and fourth income quintile. In years 5 and 6, Brazil has overall significantly higher attrition probabilities when compared with both other countries, with little exceptions.

Over all income quintiles, results show few significant differences between the three countries of interest for the standard length of a bachelor degree -4 years - but Brazil stands out as being more prone to attrition once this length is exceeded.



5

Brazil

6

0

2

- Chile

3 Academic Year

- Argentina

4

Figure 9.13. Probability of attrition from higher education in all three countries for a male born in 1991 whose most educated parent graduated high school, by household income quintile and country

Figure 9.14 shows some differences when looking at the probabilities of attrition from a cultural capital perspective. Brazil, overall, has significantly higher probabilities of attrition than at least one of the other countries for all categories of parental education, with two exceptions: for the lowest parental education in years 1 and 2 and for individuals whose most educated parent did some college in years 3 and 4. As was the case for income quintiles, Chile and Argentina have non-significantly different probabilities in most instances. The most important difference is for the first year, where Chile has significantly higher attrition hazard for all parental education categories, except for the least educated. Another noticeable difference is for individuals with the least educated parents in years 3 and 4: if they live in Chile, these individuals have significantly higher hazard rates in Argentina. In all countries, probabilities of attrition overall seem to decrease with higher cultural capital, a result that was also present in the individual models.



Figure 9.14. Probability of attrition from higher education in all three countries for a male born in 1991 from the third quintile of household income, by parental education and country

Conclusion

The chapter details the results obtained by running the discrete time analyses for higher education attrition. As was the case for the models of participation and college choice, the models of attrition reveal weak fit to the data, through high BIC statistics. In an attempt to improve the fit of the model to the data, interactions were added to the individual models, including gender and income quintiles, gender and parental education, birth cohort and income quintile, birth cohort and parental education, gender and region, as well as birth cohort and region. However, in all three country cases, the best fitting model, as shown by the lowest BIC statistics, was the original one without the region variable or any interaction. The lack of fit of the model to the data is in line with the literature that suggests many factors, beyond parental education and household income, play a role in a student's decision to persist to graduation.

Overall, when looking at income quintiles, individual models show that they have little importance in all three countries for attrition hazard, which means that there is little inequity based on financial capital when it comes to attrition in this set of countries. Comparing countries, Chile and Argentina do not differ importantly in their attrition hazard. Indeed, except for the first year where Chile displays a higher hazard of attrition, Chile and Argentina have similar attrition probabilities throughout the academic cycle. Brazil, on the other hand, has significantly higher hazard of attrition for all income quintiles in years 5 and 6. It is interesting to note that for the poorest income quintile, there is few significant difference between the three countries of interest.

When looking through the lens of cultural capital, using parental education as a proxy, there is overall more inequity in all three countries, with children from more

educated background being less likely to drop out. Interestingly, when looking at individual models, it is possible to notice that the biggest gap between two categories of parental education is not similarly located in all three countries (as seen in the individual graphs for parental education). In Chile, the biggest gap is between some college and college graduate; in Argentina, it is between less than high school graduate and high school graduate; and in Brazil, between high school graduate and some college. This shows that in Chile, inequity is favoring the most educated while in Argentina it hinders the least educated, a difference that is somewhat also observed in the combined model.

Looking at regional variation, Chile seems to be pretty impervious to location when it comes to attrition. Argentina, on the other hand, displays the largest regional variation, especially for students with low socio-economic backgrounds – i.e. from the lowest income quintile and/or with the least educated parent

10. ACCESS, COLLEGE CHOICE, AND ATTRITION THROUGH THE LENS OF TUITION FEES POLICIES.

A close examination of the access, college choice, and attrition in Chile, Argentina, and Brazil has revealed important insights regarding the differences and similarities in countries with different tuition fees policies. This chapter offers a summary of significant findings in response to the research questions raised at the beginning of this study, using the specific lens of tuition fees policies. It then discusses limitations of the study as well as the restrictions it imposes and caution it calls for when using this study for policy making. This chapter later focuses on other factors influencing access and success in higher education and how these can have a particular influence on the three countries of study and on the trends observed in this dissertation. The following section will put the study undertaken in this dissertation in the context of current international higher education studies. It shows how this study opens new doors for comparative international higher education research and how it contributes to the field. Finally, this dissertation comes to a close with the discussion of the implication of this study for policy-making and for future research.

Interpretation of Findings

Participation

The results from this dissertation started with the analysis of participation defined here as the enrollment in higher education without regard for duration or completion. When looking at participation, Chile – the only country in this country set that charges tuition fees in the public sector – is quite positively compared to the two other countries. Chile has indeed overall higher participation than Brazil and similar participation to Argentina – both having free public higher education systems. The difference between the two latter systems is without doubt the result of restriction of seats in Brazil (Knobel, 2015) when Argentina has implemented an open-access policy in the free public sector (Garcia de Fanelli, 2014). It is however interesting, in particular in the context of this dissertation, to note that Chile and its expensive tuition fees achieve similar participation rates to Argentina where higher education is free for all. This hints at the fact that tuition fees themselves, when adequately supported by financial aid, are not a hindrance for participation to higher education.

Most interestingly for a high tuition fees country, Chile is a relatively equitable country for participation across all economic backgrounds. The only exception is the wealthiest individuals who are more likely to participate. In comparison, Argentina displays equity across all economic backgrounds, while Brazil shows high economic inequity. Overall, Brazil's inequity is in line with the selection process in its free public system that favors students from private high schools (Moreno et al., 2015; Schwartzman, 2015), i.e. from wealthier backgrounds. Brazilian students from lower socio-economic backgrounds might not be academically prepared to access the free system and not be able to afford private institutions. Coming back to the case of Chile, the little inequity observed is very interesting and is a testament that higher education can be made attractive homogeneously to all economic strata with appropriate financial policies, that can indeed include tuition fees.

Looking at cultural capital tells another story. All three countries display high inequity in participation to higher education based on the cultural capital of individuals. This corroborates studies that found that higher education systems tend to favor participation from individuals who are more culturally endowed (Marginson, 2017). This inequity is even more pronounced in Chile and Argentina, where there is overall higher participation, meaning that individuals from more educated background benefit in priority from policies targeting increased access to higher education. However, it seems that this is independent of tuition fees policies. This trend, i.e. higher participation rates emphasizing inequity dependent on parental education, should be of concern to policymakers, who should strive to draft policies that aim at both increasing enrollment and bridging the cultural gap.

Overall, based on the results obtained in this dissertation and the knowledge of the higher education systems of the three chosen countries, it seems that tuition fees have not as much bearing on participation and inequity in participation in higher education as is perceived by those who call for free-tuition higher education. Although a plethora of factors influence participation beyond tuition fees (Harrison, 2017), this study shows that systems with very different tuition fees policies can have very similar participation rates and equity issues, while systems with similar tuition fees policies can differ widely in participation and equity in participation. This suggests that factors beyond tuition fees policies have more weight on participation and equity in participation, some of which will be discussed later on, and urges policy-makers to move the access debate beyond the tuition free/tuition fees sphere.

212

Comparing this study to the literature on tuition fees and participation, it is interesting to see there is indeed a difference between tuition fees changes within a national system and the cross-country comparison of tuition fees policies. Literature on within-country tuition fees changes suggest that higher tuition fees decrease enrollment, even if moderately (Heller, 2001; Leslie & Brinkman, 1987). This study shows that policies as different as no tuition fees and high tuition fees can yield similar participation probabilities and similarities in equity. The literature also suggests that tuition fees increases impacted lower socio-economic backgrounds more deeply (Heller, 1997; Kane, 1995; Leslie & Brinkman, 1987). However, this study shows that, at a national level, economic equity is not dependent on the tuition policies, while cultural inequity is pervasive to all policies.

In terms of participation, this study shows that tuition policies have little influence. The way these policies are implemented and the support systems that are in place in terms of financial aid for instance might matter more than the tuition fees policies themselves. Other factors, such as the cultural expectation that higher education is necessary to get a good career, the availability of vocational education, and participation in primary and secondary education might have more influence than tuition fees policies.

College Choice

The analysis of college choice decisions, in the somewhat simple form of the choice between the public or private sectors, is a logic follow-up to the study of higher education participation. Chile, the only tuition fees charging system in the chosen set of

countries, is on par with Brazil in terms of enrollment probabilities between the public and private sectors. These countries both have very developed private sectors that welcome more than half of their student body. On the contrary, Argentina remains a mostly public system (Garcia de Fanelli, 2014), with a small private sector that explains the choice of the majority to attend the public sector in availability terms. The difference observed between Brazil and Argentina, two free public higher education systems, stems in part from their opposite access policies: Argentina's open door access policy in the public sector contributes to the low enrollment in its private sector (Levy, 2015), while Brazil's restriction of the size of its public sector led to the development of a demanddriven private sector (Knobel, 2014). Like for participation, it is interesting to note that Chile, with its high tuition fees policy, achieves similar diversity in the choice of the sector than one of the two countries with tuition-free public sectors. It is however not surprising providing that Chile has a fixed-size public sector in terms of the number of universities affiliated to the CRUCH, which presents similarities with the Brazil public system restricting the number of students. Therefore, it seems that policies defining access to the public higher education systems might be better determinants of college choice than tuition fees policies.

Looking at college choice through the lens of the economic backgrounds of students, it is intriguing to note that students in Chile make similar choices independently of their economic background. It is particularly interesting when considering that CRUCH universities are accessed through a standardized entry exam, but should also account for the fact that the vocational sector in Chile is completely private (Bernasconi, 2011). Both Argentina and Brazil display differences in college choice based on individual economic backgrounds, with wealthy individuals having higher probabilities of choosing the private sectors than poor individuals. This makes sense in countries where the options are either the free public sector or the fee charging private sector. Participation of poor students in Brazil is probably highly dependent on them accessing a public institution, that they do not have to pay for. However, this is unlikely in Argentina where the public sector is open to all who complete secondary education, therefore higher enrollment in the private sector for higher economic strata might be simply due to opportunity. In terms of college choice, Chile and its expensive tuition fees achieves better equity in terms of economic background than the two free systems, showing that tuition fees are not an obstacle to giving varied opportunities to all individuals. It should however be put in the context of a completely private vocational system, thus accounting for the attractiveness of the private sector for less well-endowed students.

Opposite conclusions can be drawn when looking at college choice through the lens of cultural capital. Chile has the biggest gap in choices probabilities between individuals with the least cultural capital and those with the most cultural capital, which is without doubt in part accounted for by the private nature of vocational institutions in the country (Bernasconi, 2011), but also linked to the high quality of its public universities. The trends of the two free systems are inversed, with more educated Brazilians having higher probabilities to choose the public sector than less educated ones, while the reverse is true in Argentina. This might be linked to quality issues in both countries, with Argentinian public universities struggling (Rabossi, 2013) while the Brazilian private sector is in part considered low quality (McCowan, 2007). Interestingly, these quality issues are linked to massification, which creates low quality in the Argentinian public sector as it struggles to accommodate ever more students on public funds, while in Brazil additional students have to turn to the private sector that, in part, has to function on low tuition fees to be attractive to students rejected by the public system. Although this study does not investigate the cause of inequity in attending the public versus the private sector in Chile, Brazil, and Argentina, the results above as well as knowledge of the three systems can hint at the fact that tuition fees alone cannot account for such a difference, and that diversification and quality issues probably play a significant role.

Comparing these results to the literature of tuition fees and college choice, it is interesting to note that the case of Chile seems to negate the findings that student from lower economic backgrounds make different choices (Perna, 2006). By making its system homogeneous in tuition fees, Chile seems to have taken the financial considerations out of the equation of college choice contrarily to both Argentina and Brazil – although the fact that no vocational institution is public at least partly explains the importance of the private sector for lower economic strata. As seen above, the cultural capital seems however to be all the more important for college choice in Chile, while college choice is more homogeneous across sectors in Brazil and Argentina. In systems where higher education is free, results from this study tend to show that college choice is more heavily linked to cultural capital. These results agree with Perna's model of college choice (2006), which includes the higher education context as an essential layer in the student environment that shape opportunities and options.

216

Attrition

Finally, the analysis of student decision to persist or drop-out from their undergraduate degrees complete this comparative study of the access and success of Chilean, Argentinian, and Brazilian students in higher education. The most striking finding is that there is overall little difference in attrition between the three countries in the first two years. For years 4 to 6, and in particular those that exceed the normal length of an undergraduate degree, Brazil, however, has significantly higher attrition. This overall supports the fact that tuition fees policies have little link to attrition, since countries with vastly different tuition fees policies do not differ, while countries with similar policies do differ. In particular, throughout the years, attrition in Chile is often comparable to either Argentina or Brazil. National policies on financing higher education seem therefore to not be linked to individuals' decision to drop out.

In all three countries of interest, there is little evidence of inequity in attrition based on the economic background of students. This tends to reinforce the idea that economic conditions – including tuition fees and the financial capital of students – do not weight heavily on attrition and persistence in higher education.

Similar to the analysis of participation and college choice, cultural capital seems to be a more important factor than financial capital in the study of equity in attrition from higher education. On average, over the six academic years analyzed, Brazil displays the highest inequity based on cultural capital followed by Argentina. This is a striking finding where both countries with free public sectors have more inequity based on cultural equity in attrition trends than the country with tuition fees. Also of interest in this analysis, and as mentioned in chapter 9, is the fact that in Chile inequity favors individuals with high cultural capital, while in Argentina it hinders individuals with the least cultural capital.

Through this study, different trends in attrition across academic years were observed in the three countries. The little difference observed between Chile and the two free countries as well as the difference observed between Brazil and Argentina hint at the idea that tuition fees policies are not strongly linked with attrition, corroborating previous studies showing that tuition fees changes have little relation with attrition (Bruckmeier & Wigger, 2014; D. Johnson, 2008). Although the socio-economic status of students has been previously linked to persistence in the literature (Kuh et al., 2006), this dissertation shows that the economic status in all three countries bears little importance – independently even of their tuition fees policies. Cultural capital, on the other hand, played a key role for all, although a slightly more important one in countries with free systems. The absence of tuition could be working counterintuitively, in the absence of financial sacrifice, by lessening the commitment of students, in particular those from lower cultural backgrounds who might be pressured by the opportunity cost. Quality is also an important issue with the need for systems to guarantee the possibility of completion in a minimal time when their students are paying "customers," while there is less accountability in free systems.

A Note on Gender

Although gender was used as a control variable in our model and not a main predictor, it is interesting to note the different relationships in the three countries between gender and student access decisions. In all three countries, females have greater odds of participation to higher education than males, a difference that is particularly high in Argentina. The reasons why such differences exist between the three countries, as well as why the gender gap in Argentina is so extensive, should be further researched to understand the underlying cultural and social characteristics.

The relationship between gender and attrition is also not straightforward and differs in the countries of interest. In Chile, there is no difference in attrition between male and female, while in both Brazil and Argentina females have lower odds of attrition. This again would require further investigation to understand the reasons for such differences and the causes of gender inequity in higher education completion.

Summary of Findings' Interpretation

Although a causal link cannot be claimed between tuition policies and the findings presented here, it is interesting to note that the only country with tuition fees in the sample used here – Chile – is always on par (i.e. as equitable or inequitable) with at least one of the free tuition systems. This is true for the three examined decisions: participation, college choice, and attrition. Chile is also not a system that creates inequity among economic strata: if anything, it is the most equitable country across all economic backgrounds for college choice and attrition, and is second to Argentina and far more equitable than Brazil in participation. If equity is looked at through the lens of cultural capital, however, Chile is the most inequitable for participation and college choice but the least for attrition.

Considering tuition fees policies and access, tuition fees might be somewhat of an equalizer in terms of economic backgrounds. This is also very probably linked to

appropriate targeted policies in high tuition countries that ease the financial burden of those unable to afford higher education, as is the case in Chile with the availability of grants and loans (Bernasconi, 2014a). However, tuition fees policies seem to be also linked with an increased importance of cultural capital for most higher education decisions. The support of friends and family who recognize the value of higher education seem all the more necessary in countries where higher education requires substantial financial investments.

Limitations

Like all research studies, this dissertation suffers from limitations that should be detailed and understood when interpreting its results.

To begin with, many limitations are related to the chosen data sources and what they do and do not include. Although this has already been highlighted in the design of the survey, it is reiterated here. This dissertation uses socio-economic surveys, which are not primarily focused on education. Therefore, the design of this study was shaped by the availability of data in more than one way. First, the sample had to be restricted to individuals living with family, in an attempt to capture their socio-economic background through household income and head of households' educational attainment. Second, the indicator of college choice was limited to the distinction between the public and private sectors due to the lack of additional information in some of the surveys. This creates issues in the analysis of college choice, specifically when considering the differences between countries in what is included in the public or private sector. Further distinctions, especially between vocational and college education, would have helped give a better understanding of the institutional context in which students make decisions. Third, the analysis of attrition was also restricted: it lacked important information mostly about the expected and actual time to completion. With such information, this study could have distinguished attrition for short-cycle and long-cycle degrees. Most importantly, because of the absence of time-to-degree data, students having already completed their degrees could not be included in the study, thus artificially increasing attrition hazards. Moreover, it made it mandatory to focus on attrition – as only time-to-drop out is available – rather than persistence – the preferred metric in higher education. Overall, the datasets that were chosen for their representativeness, availability, and comparability across the three chosen countries did restrict importantly the design of the study.

Additionally, the Argentinian socio-economic survey includes few migratory or ethnic variables, thus preventing this study from controlling for underrepresented minorities. This is particularly damageable in these Latin American countries with neglected and/or withdrawn indigenous people – especially the Mapuche population in Chile, as well as Afro-Brazilian and aborigines in Brazil. While the right to education is well-established for the majority, ethnic minorities in these countries participate less in formal education systems and get less opportunities (Morrison, 2015).

The sampling of the socio-economic surveys is also a limitation in that it determines the generalizability of findings. The best example is the Argentinian survey whose sample only focuses on cities with more than 100,000 inhabitants. Thus, this study is only representative of about 60% of the Argentinian population (Demombynes & Verner, 2010) and tells little if not nothing about students living in rural areas. Although

socio-economic surveys are in general quite representative, they also often fail to include remote rural areas, thus creating generalizability issues for within-country findings.

The generalizability of the findings at the country-level is also limited by the country choices. The specific set of chosen countries does not allow for generalizing the findings beyond the geographic region studied. Indeed, results from a set of three countries that have such similarities cannot be generalized in the absence of similar studies being undertaken in other regions of the world. Additionally, in a comparative perspective, some studies suggest that quite a large number of countries is necessary for obtaining robust results (Bryan & Jenkins, 2013) thus restraining the impact of the results presented here. This study does show that different tuition fees policies can have similar access scenarios, but it is unclear whether the similarity of these scenarios would be true anywhere or if it is a feature of the shared cultural and historical heritage of the three countries.

Another limitation is the absence of causation, i.e. this study never claims that access decisions and access equity as analyzed here are caused by tuition fees policies. What it shows is that both access equity and access inequity can develop similarly in countries with radically different tuition fees policies – i.e. free systems versus high tuition fees public system. In an era where free higher education is demanded by students and attractive to policy-makers as a way to tackle inequity in access, it is interesting to note that tuition free systems have similar, and sometimes worse, access issues to systems with tuition fees.

Concerning the fit of the models, the goodness of fit of all the models – individual and combined – are typically very low, as commented on in the different result chapters.

Although the value of comparisons between countries is not fully compromised, it does call into question the predictive power of the models. Therefore, the results presented here should only be used with caution and in the context of the comparison between the three countries, with the goal of contributing to a better understanding of the role of tuition fees policies in student access decisions. It is however interesting to note that the poor goodness of fit of the statistical models are consistent with the literature, in that multiple factors beyond household income and parental education play roles in students' decision processes.

Last but not least, socio-economic surveys in developing countries are extremely important to the government as they allow the estimation of poverty rates. Recent changes in all three surveys prove how important these are to contemporary governments. Countries put a lot of thoughts and effort in income data collection and analysis, in particular. However, there is a lack of overall technical documentation for the three surveys, as seen on their respective websites. Additionally, because education is not the module of interest in socio-economic surveys, little attention is given to these modules. Therefore, although nonresponse rates presented in chapter 6 indicate quite accurate data overall, this study goes further by comparing rates of participation, college choice, and completion found in the literature with statistics obtained from the datasets (see Table 10.1). These estimations show a great quality of data for Argentina and Brazil, where estimations obtained from the surveys are always close to the ones from the literature. The CASEN Chilean survey seems to be underestimating participation and private sector enrollment, which indicates somewhat lesser quality of data. Participation numbers in particular seem to be quite lower than should be expected, and therefore the results from

this study should be handled with caution for Chile.

Table 10.1. Comparison of key statistics between the literature and the surveys, by country

	Chile	Argentina	Brazil
Gross Enrollment Ratio (GER)	84%	80%	46%
GER - calculated	66%	72%	47%
% enrollment in the private sector	74%	26%	74%
% enrollment in the private sector - calculated	65%	19%	73%
Graduation rate	60%	31%	51%
Graduation rate - calculated	53%	37%	54%

~ . . .

Note: GER is calculated as the ratio of all enrolled in higher education by the number of survey participants in the 5-year age group following the high school completion age (19 to 23 years old). Enrollment rate in the private sector is calculated by dividing the number of current students in the private sector by the total number of students. Finally, graduation rates are calculated by looking at the 25 to 29-year-old population and computing the ratio of those who completed to those who started. In all these cases, we use data from the 2013 surveys.

These statistics are compared to the Gross enrollment calculated by UNESCO (UNESCO Institute for Statistics, 2013), the private sector data from national sources (see chapter 5), and the graduation rates from the Centro de Estudios de la Educacion Argentina (2015).

Factors Influencing the Results

In line with the limitations just highlighted, this section aims at emphasizing some

factors that could have influenced the results beyond tuition fees policies and how they

might have increased or decreased the observed differences between Chile, Argentina,

and Brazil.

Participation

An important and quite logical driver of enrollment in higher education is

enrollment in secondary education. A minimum of 80 percent enrollment in secondary

education has been shown to be important to ensure higher tertiary enrollment rates

(Michaelowa, 2007). Chile, Argentina, and Brazil all exceed 80 percent net enrollment

rates at the secondary level, with respective figures of 88.6%, 88.1%, and 81.9% (World Bank, 2013). The lower net secondary enrollment ratio in Brazil could explain part of its lower participation rate in higher education.

Another key factor characterizing high participation systems (HPS) are favorable policies designed to open higher education (Marginson, 2016). This is indubitably the case in Argentina where public universities are free and open access (Garcia de Fanelli, 2014). In Chile, policies designed in the Pinochet era are at the origin of current high participation (Bernasconi, 2014b). They allowed the development of private higher education and created vocational higher education, thus supporting wider enrollment. Brazil, on the other hand, restricts access to its public higher education because of its dependence on federal or state funds (Knobel, 2014). In the private sector, expansion has been overall encouraged with favorable tax exemption and by legally allowing for-profit higher education in the early 2000s (Martins, 2013; Salto, 2014). However, those measures have failed to produce a high participation rate despite the important growth of the private sector (Salto, 2014). High restrictions in the public sector might therefore still have influenced Brazilian participation.

Urbanization also has a relationship with higher education participation (Marginson, 2016). The United Nations (2014) estimated that 85 percent of Brazilians live in urban areas, a slightly lower rate than the 89 percent of Chileans and 92 percent of Argentinians. This could account for some of the differences observed in terms of participation in Brazil, with overall lower participation but also very low participation from individuals from low socio-economic backgrounds. Other factors influencing participation have been highlighted in the literature, including market forces and social demand, but national system variation remains prevalent and makes it hard to point out the exact factors that lead to high participation rates (Marginson, 2016). Without doubt, the sheer size of the Brazilian population, with about 200 million inhabitants – nearly 5 times the population of Argentina and 10 times the Chilean population – is part of the issue.

College choice

Perna's model of college choice (2006) clearly identifies the context as an essential element weighting in the college choice decision. More precisely, she describes three contexts that influence college choice: the social, economic, and policy context; the higher education context; and the school and community context. Although this model, like most of the literature on college choice, is based on studies designed and implemented in the United States, the author's willingness to propose a framework appropriate for all students' groups in the United States led to a very comprehensive model taking into account the specific environment in which an individual grows up and lives. As a result, it can be argued that Perna's model can be useful for studies in other countries, if the outer layer "Social, economic & policy context" is understood to include cultural and national characteristics, while the second layer "Higher education context" includes characteristics and specificities of the whole system as well as the individual institutions. In the below description of factors that could influence college choice in Chile, Brazil, and Argentina, this wider understanding of Perna's model is adopted.

The outer layer in Perna's model consists of the social, economic, and policy context which obviously would differ in the three countries that were analyzed. As examples of contextual policies impacting college choice, Perna (2006) cites demographic changes, unemployment rate, and the establishment of new need-based grant programs. Although it is impossible to list comprehensively the relevant elements in this context for all three countries, below are a few examples of what could have impacted college choice in Argentina, Chile, and Brazil. Since 2001, Brazil has had quota-based affirmative actions in its universities, favoring students from ethnic minorities and/or low socio-economic backgrounds. This probably influenced college choice for these populations as they might favor universities implementing advantageous quotas – the scope of these policies differing geographically (Lloyd, 2015). Chile, on the other hand, has several government-funded grant programs. The two largest programs targeted at needy student – becas bicentenario and becas Juan Gomez Millas ("En 45% aumentó cantidad de estudiantes preseleccionados para obtener becas del Estado," 2015) - have specific criteria on the university choice for students to be eligible (International Comparative Higher Education Finance and Accessibility Project, 2006), which obviously affects college choice for eligible students.

The second layer in Perna's model is the higher education context. Perna argues that higher education institutions influence college choice through active and passive information sharing, through their attributes, through selective admission policies leading to student self-selection, and through availability of seats. In both Brazil and Chile, publicly-financed institutions selecting students on the results of the standardized entry tests – respectively the ENEM and the PSU (DEMRE, n.d.; Travitzki, Calero, & Boto, 2014) – are without doubt less attractive to students from lower socio-economic backgrounds who might not think they can succeed and not even try. This certainly affects the attraction of publicly-financed higher education in both these countries for different populations. Argentina's open access policy where every individual completing higher education is guaranteed a seat in public higher education undoubtedly affects college choice by making public institutions reachable by all and decreasing the draw of costly private higher education.

The third layer in Perna's model is the school and community context, i.e. the resources students have access to in high-school and in their direct environment in terms of college information and general help with the process of selecting a college. Indeed, in Brazil, students from private high schools are more likely to both sit the ENEM and get access to a public institution (Bowater, 2015; Schwartzman, 2015). It means that private high schools prepare students better for university in general but also give them more opportunities in terms of college choice. In Argentina, similarly, students from private high schools represent a higher share of students in university education compared to the share in non-university education. They also represent a higher share of students in private higher education compared to their share in public education (Kisilevsky & Veleda, 2002). This shows that secondary education in Argentina bears an important weight on the college choice of individuals.

Attrition

A review of the literature on student success highlighted a few factors at the national level that were linked to persistence (Kuh et al., 2006). These include academic

228

intensity in high school, financial aid, and enrollment patterns – all of which are important in the three countries analyzed here.

Academic quality in high-school is hard to measure, but PISA results can give a comparative basis as to the capacity of high schools in Chile, Argentina, and Brazil to prepare students academically for college. Chile is doing better than both Argentina and Brazil in mathematics, reading, and science (Organisation for Economic Co-operation and Development, 2014b), giving its students a head start and a more solid academic basis for college. This explains parts of Chile's lower attrition in higher education.

Considering financial aid, Chile has quite a developed system with a means-tested income contingent loan scheme that can be used to pay for tuition fees in CRUCH universities. It is complemented by a scholarship program for tuition fees for low-income students. There is an additional loan scheme for students going to private institutions. There is also a variety of grants students can apply to (International Comparative Higher Education Finance and Accessibility Project, 2006). The extent and diversity of financial aid options to students makes it more likely that they will persist through higher education. Brazil also has a good financial aid system in place to help students going to private institutions: ProUni is an incentive for private institutions to provide grants to students from low socio-economic backgrounds and minorities via tax breaks (International Comparative Higher Education Finance and Accessibility Project, n.d.). A loan program is also available for needy students who do not have access to ProUni grants (International Comparative Higher Education Finance and Accessibility Project, n.d.). Students who have access to these grants and loans are probably more likely to persist. Argentina, on the other hand, does not have an extensive financial aid system

because of its tuition free policy. But as students face cost beyond tuition fees, the lack of a financial aid program to help with both daily costs and opportunity costs of attending full-time higher education (Goldrick-Rab, 2016) could be damaging persistence in Argentina. Indeed, the literature shows that Argentina has an important problem with persistence in higher education (Bonasegna Kelly, 2013).

Enrollment patterns are also important as the literature shows that delayed entry in higher education leads to a higher dropout rate (Kuh et al., 2006). Unfortunately, information about delayed entry in Chile, Argentina, and Brazil is not available.

Comparative Higher Education and Big Data

This dissertation inscribes itself in the field of international higher education. This field appeared in the 1960s and blossomed in the 1990s (Kosmützky & Nokkala, 2014). However, in the past two decades, publication of international comparative higher education studies has been relatively stable, with just a small increase in 2009 (Kosmützky, 2015). This stability, at a time when globalization takes the forefront in the field and when international rankings influence policy, is worrying but is undeniably a testament to the difficulty of undertaking international comparative higher education studies. These difficulties have been highlighted in the literature (Kosmützky, 2015), and in particular the complexity of "creating feasible research designs with conceptual and methodological integrity and clarity, with traction on complex, real world topics, as well as scientific and policy relevance, all the while offering a balance between analytical generalizability and solid explanations of complex realities" (Kosmützky & Nokkala, 2014, p. 377)

The contribution of this research to the literature is in part due to the research design. A three-country comparative international higher education study, this dissertation is consistent with what is found in the literature (Kosmützky & Krücken, 2014). However, it innovates in the countries of study: Chile, Argentina, and Brazil were all categorized as countries infrequently studied in comparative international higher education (Kosmützky & Krücken, 2014). This dissertation therefore contributes to the knowledge-base about Latin American higher education.

The datasets chosen to design the study discussed here is also of importance. Quantitative comparative studies are dependent on the finding of national or regional datasets that are complete, reliable, and most importantly comparable. As such, quantitative studies are very difficult to design in the context of developing countries where data is scarce ("Off the map," 2014). Socio-economic surveys could be an answer to this difficulty, as they are widely implemented and have similar designs across countries. However, socio-economic surveys are still limited in the education information they provide, although the Chilean survey shows promising progress with a more detailed education module. The information obtained also need to be more reliable, as shown with the attrition results in this study, where non-completion probabilities were really low compared to what is found in the literature. Because these surveys exist in most countries around the world and are undertaken regularly with a process and resources already in place, these could be great tools for the field of international higher education. Researchers should advocate for better designed education module to help answer comparatively key questions about higher education in the globalized society, through reliable and representative surveys.
Improving Socio-Economic Surveys for Use in Higher Education

The first step to improve socio-economic surveys for higher education research would be to refine their sampling designs and add appropriate weights to achieve the representativeness of individuals in higher education ages. To address the first issue, Argentinian policy-makers would in particular need to extend its sampling area to cover a larger part of the territory. In Chile and Brazil, the areas covered are already extensive, although additional effort to include remote places could only improve the surveys. Second, for education research purposes, individual weights should include information about individual representativeness nationally based on their age and gender, which is not currently provided in all surveys. This would allow better precision in the analysis and prevent over- or under-representation of some individuals when using subsamples to look at educational measurements.

The second step would be to improve the design of the surveys through a better, more comprehensive line of questioning in the education modules. In particular, the type of higher education attended – university or vocational – is of importance, as well as including a variable for time to graduation, for undergraduate studies in particular but also for postgraduate studies. Among missing variables that would have been extremely helpful to this study, financial aid information also stands out – both in terms of financial aid knowledge before making the decision to participate and the type of financial aid received while attending. A comprehensive survey of higher education targeted at access and success would include all the information mentioned before, as well as additional questions to try and include all the factors influencing access decisions, for instance data on an individual's support systems. Finally, to ensure more reliable analysis in the future, all respondents should be asked for their parents' educational attainment, to ensure the comprehensiveness of information independently of their living situation. Ethnicity should also be added in all surveys to better understand how different groups make different choices in higher education. These additions would guarantee a greater appreciation of causes of inequity in higher education.

Practically, to improve the line of questioning, Brazilian and Argentinian survey designers could take the Chilean survey as an example to implement preliminary modifications, as the Chilean education module is much more detailed than its two counterparts, and includes information about vocational education, financial aid, and parental education for all. This would be a sound basis for further improvement to address the issues raised above.

Policy Implications

Many policy makers are faced today with the challenges of simultaneously improving participation in higher education, ensuring better completion, and fostering equity in the system. While higher education funding is an easy target to explain inequity, this dissertation shows that financing, and more specifically tuition fees, are not necessarily a hindrance to participation, completion, and equity in higher education.

In fact, countries that have recently decided to eliminate tuition fees are facing critical issues. In Chile, where a law was passed at the end of 2015 to start the process of making higher education free for all in the public and private sectors, only students from the 50 percent poorest households attending eligible institutions are not charged tuition

fees. In 2017, eligible institutions included about half the universities, but barely more than 10 percent of the vocational and professional institutions (Ministerio de Educacion, 2017). This means that the policy only reaches few students – less than 15 percent of the student population in 2016 (Herrera, Said, & Pardo, 2016) – and is unfair to some students, namely the poor ones in ineligible institutions. Although Chile's law is innovative and unique by providing free higher education in both the public and private sectors, thus attempting comprehensiveness and equality, its current reality is very far from the advocated ideal. Current financial issues in Chile make it moreover unlikely that a radical change will be made in the coming years, leaving a poor policy in place for now.

In the Philippines, similarly, a bill was passed in 2017 to make higher education free in the public sector. As soon as it was passed, it was however criticized by the very advocates of free tuition in the country who now fear that free tuition will lead to widespread inequities in the future and will restrict access to higher education, in part through hikes in nominal fees (Gardner, 2017).

Even in Germany, where tuition fees were allowed in 2005 and then eliminated in 2014, tuition fees policy is a perennial debate and is currently being discussed again as part of the 2017 presidential electoral campaign (Gardner, 2017). Different policy-makers are advancing new possibilities in the name of social justice and equity, thus implying that free-tuition policies do not achieve these ideals.

Therefore, free tuition is neither a straightforward policy, nor one that will systematically improve access and success in higher education. When targeting better access, success, and equity in higher education, policy makers should turn away from easy financial fixes and try to comprehend the complexity of students' circumstances and higher education environments to design proper targeted policies. Indeed, access policies have been shown to hinder or improve participation and completion in free countries as much as in others. For instance, in Brazil, a recent research report showed that students benefitting from affirmative action quotas to enter public higher education are as successful as others (Hurtado, 2017). On the contrary, in Ecuador, the entrance exam that was set up at the same time as free tuition is under widespread criticism for reproducing inequalities and preventing the democratization of higher education ("Manifiesto: Una mirada crítica al sistema de admisión a las universidades públicas del Ecuador," 2015). While the presence of an entrance exam to higher education indubitably limits access to students having access to the best preparation – in K-12 and at home, like it does in Brazil, eliminating it would probably create quality issues as the system struggles to absorb demand. Therefore, independently of tuition fees policies, access policies are of utmost importance to ensure the participation and completion of underrepresented groups and thus foster equity.

Another important policy area that has a direct influence on higher education is K-12 education. As seen before, the K-12 environment is important in all student decisions analyzed here: enrollment in and completion of K-12 dictates higher education eligibility, K-12 contexts and involvement in the future of their scholars play a role in college choice, while K-12 quality is related to persistence. Therefore, higher education cannot be looked at in isolation in the educational system of a nation, it is part of a bigger and more complex system. Any policy that aims at improving access and success in higher education should therefore be mirrored in the K-12 system, as only a strong K-12 system could ensure a more universal system of higher education.

Going back to tuition fees and their relationship to access and success, there is, according to this study, no reason to avoid tuition fees at all costs. Indeed, tuition fees could be a good way to inject some money into the higher education system, as long as it is supported by targeted financial aid systems. These financial aid systems not only alleviate tuition fees for the poorest, but also ensure they can afford board and room during their studies. They also should target all vulnerable population, i.e. use indicators beyond financial capital, including parental education, ethnicity, and K-12 education. This would constitute a more effective policy to ensure access and success, by spending the little state expenditure where they are really needed.

A final word of caution for policy-makers contemplating free higher education seems to be in order. Making public higher education free for all is a very complex policy to reverse, especially since it is such a strong political message to students and families. Re-introducing cost-sharing after making higher education free would be faced with the discontent of voters and would be a very unpopular political measure. Access policies on the other hand might be less strong political statements but in the long-term would more surely have the desired effect: improving equity in higher education.

Final Thoughts and Future Research

Looking at student decisions across Chile, Argentina, and Brazil was enlightening towards the role of national tuition fees policies in access and success to higher education. While free-tuition higher education is becoming increasingly popular among students and policy-makers, it is not a miracle solution to the issues encountered today by higher education around the world, in particular to access, success, and equity issues. As countries around the world change tuition fee policies, a perfect set up is provided to compare the effect of different policies - using for instance the establishment of free tuition in the Philippines and the establishment of tuition fees with financial aid in the United Kingdom. In the coming years, it will be particularly interesting to continue to study countries that recently implemented free-tuition policies: in particular, the situation in Chile and the Philippines provide quasi-experiments' conditions that in three to five years will help understand how the elimination of tuition fees impact access and equity in higher education. Additionally, while previous research has consistently highlighted the role of financial aid in student access decisions (Bettinger, 2004; Dynarski & Scott-Clayton, 2013; Forsyth & Furlong, 2000; Goldrick-Rab et al., 2012; Perna, 2010), policies combining tuition fees with strong financial aid programs should be further studied and evaluated. Such research need to differentiate the use of financial aid for tuition fees coverage or for other cost incurred by students. Only then will it really be possible to differentiate the role of tuition fees policies and look at the real cost and financial obstacles encountered by students.

In particular, following the lead of Goldrick-Rab (2016), emphasis should be put on the need of students who cannot afford tuition fees, and distinction must be made between students who need tuition fees coverage and those who need more – in terms of help paying for food and board or family support. The conversation globally should therefore not be focused on tuition fees, but rather on the design of an adequate financial aid system that take into account all real student costs and that is geared toward positively changing student decisions.

Looking at access and tuition fees policies, the limited generalizability of this study calls for other similar studies in other geographic regions and ideally with more robust datasets. Such a study could be for instance designed in Europe with EU education datasets. Additionally, further studies of free-tuition systems should focus on the third side of the higher education iron triangle (Daniel et al., 2009): quality. In studying these systems, the question of quality is essential: do systems sustaining free-tuition higher education succeed in providing high-quality education to all?

REFERENCES

- Abbott, S. (Ed.). (2014). Access. In *The glossary of education reform*. Portland, ME: Great Schools Partnership. Retrieved from http://edglossary.org/access/
- Adrian, W. (1983). The tuition dilemma in the Latin American University. *International Review of Education*, *29*(4), 449–464.
- Allison, P. (2013, February 13). What's the best R-squared for logistic regression? Retrieved from http://statisticalhorizons.com/r2logistic
- Altbach, P. G. (2007). Introduction: The underlying realities of higher education in the 21st century. In P. G. Altbach & P. McGill Peterson (Eds.), *American higher education in the twenty-first century: Social, political, and economic challenges* (pp. xv–xxiv). Rotterdam, the Netherlands: Sense Publishers.
- Altbach, P. G., Reisberg, L., & Rumbley, L. E. (2010a). Financing higher education. In *Trends in global higher education: Tracking an academic revolution* (pp. 75–84). Rotterdam, the Netherlands: Sense Publishers.
- Altbach, P. G., Reisberg, L., & Rumbley, L. E. (2010b). Private higher education and privatization. In *Trends in global higher education: Tracking an academic revolution* (pp. 75–84). Rotterdam, the Netherlands: Sense Publishers.
- André, R. (2012). Higher education in Chile. Americas Quarterly, 6(4).
- Archibald, R. B., & Feldman, D. H. (2011). *Why does college cost so much?* New York, NY: Oxford University Press.
- Ascend Learning LLC. (2012). *Student attrition: Consequences, contributing factors, and remedies*. Author.

- Astin, A. W. (1984). Student involvement: A developmental theory for higher education. Journal of College Student Personnel, 25(4), 297–308.
- Astin, A. W. (1991). Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education. Phoenix, AZ: Oryx Press.

Bain, O. (2001). The cost of higher education to students and parents in Russia: Tuition policy issues. *Peabody Journal of Education*, 76(3-4), 57–80.
https://doi.org/10.1080/0161956X.2001.9681991

- Bakia, M. (2000). Costs of ICT use in higher education: What little we know. *TechKnowLogia*, *2*(1), 49–52.
- Ballotpedia. (2015). 2016 presidential candidates on education. Retrieved from https://ballotpedia.org/2016_presidential_candidates_on_education
- Baumol, W. J., & Bowen, W. G. (1966). Performing arts: the economic dilemma. A study of problems common to theater, opera, music and dance. New York, NY:
 Twentieth Century Fund.
- Becker, G. S. (1975). Human capital: a theoretical and empirical analysis, with special reference to education (2nd ed). New York: Columbia University Press for NBER.
- Becker, G. S. (2007). Human capital. In D. R. Henderson (Ed.), *The Concise Encyclopedia of Economics*. Indianapolis, IN: Liberty Fund. Retrieved from http://www.econlib.org/library/Enc/HumanCapital.html
- Bello, J. C. del, Barsky, O., & Giménez, G. (2007). La universidad privada argentina.Buenos Aires: Libros del Zorzal.

- Bernasconi, A. (2011). Private and public pathways to world-class research universities: The case of Chile. In P. G. Altbach & J. Salmi (Eds.), *The Road to Academic Excellence* (pp. 229–260). The World Bank. Retrieved from http://elibrary.worldbank.org/doi/abs/10.1596/9780821388051_CH08
- Bernasconi, A. (2012). Chile: The rise and decline of a student movement. *International Higher Education*, (66), 27–29.
- Bernasconi, A. (2014a). Chile: An overview. In Argentina, Brazil, Chile: Engaging with the Southern Cone (Vol. 4, pp. 18–20). Washington, D.C.: American Council in Education and center for International Higher Education.
- Bernasconi, A. (2014b). Too small to succeed: Middle-income nations and the quest for distinction in global higher education. In Y. Cheng, Q. Wang, & N. C. Liu (Eds.), *How world-class universities affect global higher education: Influences and responses* (pp. 153–162). Rotterdam, the Netherlands: Sense Publishers.
- Bettinger, E. (2004). How financial aid affects persistence (NBER Working Paper Series No. 10242). Cambridge, MA: National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w10242.pdf
- Blaug, M., & Woodhall, M. (1978). Patterns of subsidies to higher education in Europe. *Higher Education*, 7(3), 331–361.

Bloom, D. E., Hartley, M., & Rosovsky, H. (2007). Beyond private gain: The public benefits of higher education. In J. J. F. Forest & P. G. Altbach (Eds.), *International handbook of higher education* (pp. 293–308). Dordrecht, Netherlands: Springer.

- Bonasegna Kelly, C. (2013, August 5). Argentina at the top For its dropout rate! Retrieved from https://www.insidehighered.com/blogs/world-view/argentina-top-—-its-dropout-rate
- Bourdieu, P. (1986). The forms of capital. In J. G. Richardson (Ed.), *Handbook of theory* and research for the sociology of education (pp. 241–258). New York: Greenwood Press.
- Bowater, D. (2015, December 3). Spotlight on Enem exam in Brazil after questions row. *Times Higher Education*.

Bowen, W. G. (2012). The "cost disease" in higher education: Is technology the answer. In *The Tanner Lectures Stanford University*. Retrieved from http://ithaka.org/sites/default/files/files/ITHAKA-TheCostDiseaseinHigherEducation.pdf

- Bower, B. L. (2001). Distance education: Facing the faculty challenge. *Online Journal of Distance Learning Administration*, *4*(2).
- Braxton, J. M. (2000). Conclusion: Reinvigorating theory and research on the departure puzzle. In J. M. Braxton (Ed.), *Reworking the student departure puzzle* (1st ed, pp. 257–274). Nashville: Vanderbilt University Press.

Briggs, S., & Wilson, A. (2007). Which university? A study of the influence of cost and information factors on Scottish undergraduate choice. *Journal of Higher Education Policy and Management*, 29(1), 57–72.
https://doi.org/10.1080/13600800601175789

- Bruckmeier, K., & Wigger, B. U. (2014). The effects of tuition fees on transition from high school to university in Germany. *Economics of Education Review*, 41, 14–23. https://doi.org/10.1016/j.econedurev.2014.03.009
- Bruenig, M. (2014, May 24). Even making college free wouldn't reduce America's wealth gap. *The Week*. Retrieved from theweek.com/articles/446684/even-making-colleg-free-wouldnt-reduce-americas-wealth-gap
- Bryan, M. L., & Jenkins, S. P. (2013). Regression analysis of country effects using multilevel data: A cautionary tale (Discussion Paper Series No. 7583).
 Forschungsinstitut zur Zukunft der Arbeit.
- Burkholder, G., & Holland, N. (2014). International perspectives on retention and persistence. *Higher Learning Research Communications*, 4(2), 3. https://doi.org/10.18870/hlrc.v4i2.208
- Byers González, J. M., & DesJardins, S. L. (2002). Artificial neural networks: A new approach to predicting application behavior. *Research in Higher Education*, 43(2), 235–258.
- Cabrera, A. F., & La Nasa, S. M. (2000). Understanding the college-choice process. *New Directions for Institutional Research*, 2000(107), 5–22.
- Callender, C. (2006). Access to higher education in Britain: The impact of tuition fees and financial assistance. In P. N. Teixeira, D. B. Johnstone, M. J. Rosa, & H. Vossensteyn (Eds.), *Cost-sharing and accessibility in higher education: a fairer deal*? (pp. 105–132). Dordrecht: Kluwer Academic Publishers. Retrieved from http://link.springer.com/10.1007/1-4020-4660-X_5

- Callender, C., & Jackson, J. (2005). Does the fear of debt deter students from higher education? *Journal of Social Policy*, *34*(4), 509–540. https://doi.org/10.1017/S004727940500913X
- Callender, C., & Jackson, J. (2008). Does the fear of debt constrain choice of university and subject of study? *Studies in Higher Education*, *33*(4), 405–429. https://doi.org/10.1080/03075070802211802
- Callender, C., & Mason, G. (in press). Does student loan debt deter higher education participation? New evidence from England. *Annals of American Political and Social Science*.
- Cardak, B. A., Bowden, M., & Bahtsevanoglou, J. (2015). Are low-SES students disadvantaged in the university application process? A 2014 student equity in higher education research grants project. Perth, Australia: National Centre for Student Equity in Higher Education.
- Centro de Estudios de la Educacion Argentina, Universidad de Belgrano. (2015, April). Nuestra graduación universitaria es menor que la de nuestros vecinos Brasil y Chile. *Informe*, *4*(34). Retrieved from

http://www.ub.edu.ar/centros_de_estudio/cea/cea_numero_34.pdf

Chapman, D. W. (1981). A model of student college choice. *The Journal of Higher Education*, 52(5), 490. https://doi.org/10.2307/1981837

Cheng, Y., Wang, Q., & Liu, N. C. (2014). *How world-class universities affect global higher education: Influences and responses* (Vol. 30). The Netherlands: Sense.

Chien, C.-L., Montjouridès, P., & van der Pol, H. (2017). Global trends of access to and equity in postsecondary education. In A. Mountford-Zimdars & N. E. Harrison

(Eds.), *Access to higher education: theoretical perspectives and contemporary challenges* (pp. 3–32). Abingdon, Oxon; New York, NY: Routledge.

Citizens Information Board. (2016). Third-level student fees and charges. Retrieved from http://www.citizensinformation.ie/en/education/third_level_education/fees_and_s upports_for_third_level_education/fees.html

Cloete, N. (2015, November 6). The flawed ideology of "free higher education." *University World News*, (389). Retrieved from http://www.universityworldnews.com/article.php?story=20151104111825416#.V kDTuAIa-xI.gmail

- Clotfelter, C. T. (1996). *Buying the best: Cost escalation in elite higher education*. Princeton, N.J: Princeton University Press.
- Coleman, J. S. (1969). Equality of educational opportunity, reexamined. *Socio-Economic Planning Sciences*, *2*(2), 347–354.
- Collins, C. S., & Rhoads, R. A. (2008). The World Bank and higher education in the developing world: the cases of Uganda and Thailand. In D. P. Baker & A. W. Wiseman (Eds.), *The worldwide transformation of higher education* (1. ed, pp. 177–222). Bingley: JAI.
- Comari, C., & Hoszowski, A. E. (2013). Changes in the selection of dwellings in the labor force survey of Argentina: A simulation. Presented at the Joint Statistical Meetings, Montréal: American Statistical Association. Retrieved from http://www.amstat.org/sections/srms/proceedings/y2013/files/308893_81713.pdf
- Consejo Nacional de Educación [CNED]. (2015). *Tendencias indices 2015*. Santiago: Author. Retrieved from

http://www.cned.cl/public/secciones/SeccionIndicesPostulantes/OtrasEstadisticas/ Tendencias_INDICES_2015.pdf

Coté, J., Skinkle, R., & Motte, A. (2008). Do perceptions of costs and benefits of postsecondary education influence participation? *Canadian Journal of Higher Education*, 38(2), 73–93.

Council of Europe Committee of Ministers. Recommendation No. R (98) 3 of the committee of ministers to member states on access to higher education, Pub. L. No. R (98) 3 (1998). Retrieved from https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?

documentId=09000016804f7125

- DAAD. (2016). Brazil Research Funding. Retrieved from http://dwih.com.br/en/brazilresearch-funding
- Damico, A. (2013). Analyze the pesquisa nacional por amostra de domicilios (pnad) with r. Retrieved July 23, 2016, from http://www.asdfree.com/2013/04/analyzepesquisa-nacional-por-amostra.html
- Daniel, J., Kanwar, A., & Uvalić-Trumbić, S. (2009). Breaking higher education's iron triangle: Access, cost, and quality. *Change: The Magazine of Higher Learning*, 41(2), 30–35. https://doi.org/10.3200/CHNG.41.2.30-35

Davis Educational Foundation. (2012). An inquiry into the rising cost of higher education: Summary of responses from seventy college and university presidents. Yarmouth, ME: Author. Retrieved from https://www.davisfoundations.org/site/documents/AnInquiryintotheRisingCostof HigherEducation.pdf Dell, S. (2015, October 25). Government freezes fees as student protests mount. University World News, (387). Retrieved from http://www.universityworldnews.com/article.php?story=2015102511561443&que ry=south+africa

de Melo Costa, D. (2014, July 11). A new era for higher education in Brazil. *University World News*, (328). Retrieved from

http://www.universityworldnews.com/article.php?story=20140710115554910

- Demombynes, G., & Verner, D. (2010). *The invisible poor: A portrait of rural poverty in Argentina*. The World Bank. Retrieved from http://elibrary.worldbank.org/doi/book/10.1596/978-0-8213-8207-3
- DEMRE. (2015). Compendio estadístico: Proceso de admisión año académico 2015. Santiago: Unversidad de Chile. Retrieved from http://psu.demre.cl/estadisticas/documentos/p2015/2015-compendioestadistico.pdf
- Departamento de Evaluacion, Medicion y Registro Educacional [DEMRE]. (n.d.). El proceso de admision. Retrieved October 26, 2016, from http://psu.demre.cl/index
- Dewey, J. (1916). Democracy and education (selection). In S. M. Cahn, *Classic and contemporary readings in the philosophy of education* (2nd ed, pp. 228–264).
 New York: Oxford University Press.

de Wit, H., Jaramillo, I. C., Gacel-Ávila, J., & Knight, J. (Eds.). (2005). Higher education in Latin America: The international dimension. Washington, D.C: The World Bank. Diamond, A., Vorley, T., Roberts, J., & Jones, S. (2012). Behavioural approaches to understanding student choice. York, UK: The Higher Education Academy and the National Union of Students. Retrieved from

https://www.heacademy.ac.uk/sites/default/files/resources/student choice.pdf

Dirección Encuesta Permanente de Hogares. (2005). *Diseño de registro y estructura para las bases preliminares hogar y personas*. Retrieved from http://www.indec.gov.ar/dbindec/EPHdisenoregbaseprelimtrim 105.pdf

Diretoria de Estatísticas Educacionais DEED. (2015). Resumo técnico: Censo da

educaçao superior 2013. Brasília: Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. Retrieved from http://download.inep.gov.br/download/superior/censo/2013/resumo_tecnico_cens

o_educacao_superior_2013.pdf

- Dolinsky, A. L. (2010). The adequacy of the information that students utilize when choosing a college: An attribute importance and sufficiency approach. *College Student Journal*, *44*(3), 762–776.
- Dowd, A. C., & Bensimon, E. M. (2015). *Engaging the "race question": accountability and equity in U.S. higher education*. New York: Teachers College, Columbia University.
- Duclaud-Williams, R. (2004). Europeanisation and higher education. Presented at the ESCR/UACES Series of Seminars, University of Sheffield, Department of Politics. Retrieved from http://aei.pitt.edu/1730/1/DuclaudWiliams.pdf

- Durham, E. R. (2004). Higher Education in Brazil: Public and private. In C. Brock & S. Schwartzman (Eds.), *The challenges of education in Brazil*. Oxford: Symposium Books.
- Dynarski, S. (2000). Hope for whom? Financial aid for the middle class and its impact on college attendance. *National Tax Journal*, 53(3), 629–662. https://doi.org/10.17310/ntj.2000.3S.02
- Dynarski, S. (2002). The behavioral and distributional implications of aid for college. *American Economic Review*, 92(2), 279–285.
- Dynarski, S., & Scott-Clayton, J. (2013). Financial aid policy: Lessons from research. *Future Child*, *23*(1), 67–91.
- Eagan, K., Bara Stolzenberg, E., Bates, A. K., Aragon, M. C., Ramirez Suchard, M., &
 Rios-Aguilar, C. (2016). *The American freshman: National norms fall 2015*. Los
 Angeles, CA: Higher Education Research Institute, UCLA.
- Ehrenberg, R. G. (2000). *Tuition rising: Why college costs so much*. Cambridge, MA: Harvard University Press.
- Else, H. (2015, May 21). Chile's universities set for some turmoil on long road to reform. *Times Higher Education*. Retrieved from https://www.timeshighereducation.com/news/chiles-universities-set-for-someturmoil-on-long-road-to-reform/2020260.article
- En 45% aumentó cantidad de estudiantes preseleccionados para obtener becas del Estado. (2015, January 9). *Emol.cl.* Retrieved from http://www.emol.com/noticias/nacional/2015/01/09/698356/en-45-aumento-lacantidad-de-estudiantes-preseleccionados-para-obtener-becas-del-estado.html

- Euridyce. (2013). *National student fee and support systems* (Education and Training). Brussels: European Commission.
- Forest, J. J. F., & Kinser, K. (2002). *Higher education in the United States. An encyclopedia* (Vol. 1). Santa Barbara, CA: ABC-CLIO.
- Forsyth, A., & Furlong, A. (2000). *Socioeconomic disadvantage and access to higher education*. Bristol, UK: The Policy Press and the Joseph Rowntree Foundation.
- Foskett, N., & Hemsley-Brown, J. (2001). Choosing futures: Young people's decisionmaking in education, training, and careers markets. London; New York: Routledge/Falmer.
- Frank, R. H., & Cook, P. J. (1995). *The winner-take-all society: why the few at the top get so much more than the rest of us*. New York, NY: Penguin Books.
- Garcia de Fanelli, A. (2008). The challenges of funding higher education in Latin America. Presented at the Seminar Funding Higher Education: a Comparative Overview, Brasilia, Brazil.
- Garcia de Fanelli, A. (2014). Argentine higher education: Main features, key issues, and challenges. In *Argentina, Brazil, Chile: Engaging with the Southern Cone* (Vol. 4, pp. 6–8). Washington, D.C.: American Council in Education and center for International Higher Education.

Garcia, M. (2012). Higher education Brazil: History, policies and a case study. In *Optimizing talent - Closing education and social mobility gaps worldwide: Higher education and lifelong learning*. Salzburg, Austria: ETS. Retrieved from http://www.salzburgglobal.org/fileadmin/user_upload/Documents/2010-2019/2012/495/Session_Document_HigherEducationBrazil_495.pdf Gardner, M. (2017, March 24). University tuition fees back on the election agenda. University World News, (452). Retrieved from

Getz, M., & Siegfried, J. J. (1991). Costs and productivity in American colleges and

http://www.universityworldnews.com/article.php?story=20170323125410723

universities. In C. T. Clotfelter, R. G. Ehrenberg, M. Getz, & J. J. Siegfried (Eds.), *Economic challenges in higher education* (pp. 261–392). Chicago, IL: University of Chicago Press.

Goldrick-Rab, S. (2016). Paying the price: College costs, financial aid, and the betrayal of the American dream. Chicago ; London: The University of Chicago Press.

Goldrick-Rab, S., Harris, D. N., Kelchen, R., & Benson, J. (2012). Need-based financial aid and college persistence: Experiemental evidence from Wisconsin. Wisconsin Scholar Longitudinal Study: Madison, WI. Retrieved from http://www.finaidstudy.org/documents/Goldrick-

Rab%20Harris%20Kelchen%20Benson%202012%20FULL.pdf

- Gonzalez Rozada, M., & Menendez, A. (2002). Public university in Argentina: subsidizing the rich? *Economics of Education Review*, *21*, 341–351.
- Great Schools Partnership. (2014). Access. *The Glossary of Educational Reform*. Portland, ME: Author. Retrieved from http://edglossary.org/access/

Grubb, N., Marit Jahr, H., Neumuller, J., & Field, S. (2005). Equity in education thematic review: Finland. Paris, France: Organisation for Economic Co-operation and Development. Retrieved from http://www.oecd.org/education/school/36376641.pdf

- Gulliford, M., Figueroa-Munoz, J., Morgan, M., Hughes, D., Gibson, B., Beech, R., & Hudson, M. (2002). What does "access to health care" mean? *Journal of Health Services Research & Policy*, 7(3), 186–188.
- Gutmann, A. (1999). Democratic education (selection). In S. M. Cahn, *Classic and contemporary readings in the philosophy of education* (2nd ed, pp. 328–344).
 New York: Oxford University Press.
- Harrison, N. E. (2017). Student choices under uncertainty: Bounded rationality and behavioural economics. In A. Mountford-Zimdars & N. E. Harrison (Eds.), *Access to higher education: theoretical perspectives and contemporary challenges* (pp. 85–100). Abingdon, Oxon ; New York, NY: Routledge.
- Hauptman, A. M. (2006). Higher education finance: Trends and issues. In J. J. F. Forest
 & P. G. Altbach (Eds.), *International handbook of higher education* (pp. 83–106).
 Dordrecht, the Netherlands: Springer.
- Hauser, R. M., & Warren, J. R. (1997). Socioeconomic indexes for occupations: A review, update, and critique. *Sociological Methodology*, 27(1), 177–298.
- Hazelkorn, E. (2014). Rebooting Irish higher education: policy challenges for challenging times. *Studies in Higher Education*, *39*(8), 1343–1354.
 https://doi.org/10.1080/03075079.2014.949540

Head, J. G. (1966). On merit goods. FinanzArchiv: Public Finance Analysis, 25(1), 1–29.

Heller, D. E. (1997). Student price response in higher education: An update to Leslie and Brinkman. *The Journal of Higher Education*, 68(6), 624. https://doi.org/10.2307/2959966

- Heller, D. E. (2001). *The effects of tuition prices and financial aid on enrollment in higher education - California and the nation*. Rancho Cordova, CA: EdFund.
- Herrera, J., Said, C., & Pardo, G. (2016, avril). Mineduc confirma gratuidad a 125 mil jóvenes, la mitad de lo prometido. *El Mercurio*, p. C5. Santiago, Chile.
- Heymann, J., & McNeill, K. A. (2013). *Changing children's chances: New findings on child policy worldwide*. World Policy Analysis Center.
- Hossler, D., & Gallagher, K. S. (1987). Studying student college choice: Three-phase model and the implications for policymakers. *College and University*, 62(3), 207–221.
- Hossler, D., Schmit, J. L., & Vesper, N. (1999). Going to college: How social, economic, and educational factors influence the decisions students make. Baltimore, Md: Johns Hopkins University Press.
- Hübner, M. (2012). Do tuition fees affect enrollment behavior? Evidence from a "natural experiment" in Germany. *Economics of Education Review*, *31*(6), 949–960. https://doi.org/10.1016/j.econedurev.2012.06.006
- Huijsman, R., Kloek, T., Kodde, D. A., & Ritzen, J. M. M. (1986). An empirical analysis of college enrollment in the Netherlands. *De Economist*, *134*(2), 181–190.

Hurtado, M. E. (2017, March 10). Affirmative action students equal or outperform peers. University World News, (450). Retrieved from http://www.universityworldnews.com/article.php?story=20170307235714553&qu ery=brazil

Institute for Higher Education Policy. (1998). *Reaping the benefits: Defining the public and private value of going to college*. Washington, DC: Author. Instituto Nacional de Estadística y Censos. (2015). *Anuario Estadístico de la República Argentina 2014 - 1a Edicion*. Buenos Aires: Author. Retrieved from http://www.indec.gov.ar/ftp/cuadros/sociedad/Anuario_Estadistico_2014.pdf International Bureau of Education. (2012). Brazil. Retrieved from

http://www.ibe.unesco.org/fileadmin/user_upload/Publications/WDE/2010/pdfversions/Brazil.pdf

International Comparative Higher Education Finance and Accessibility Project. (n.d.). *Higher education finance and cost sharing in Brazil*. Buffalo, NY: SUNY Buffalo. Retrieved from http://gse.buffalo.edu/org/inthigheredfinance/files/Country_Profiles/Latin_Americ a/Brazil.pdf

International Comparative Higher Education Finance and Accessibility Project. (2006). *Higher education finance and cost sharing in Chile*. Buffalo, NY: STate University of New York. Retrieved from http://gse.buffalo.edu/org/inthigheredfinance/files/Country_Profiles/Latin_Americ a/Chile.pdf

- Ishitani, T. T., & Desjardins, S. L. (2002). A longitudinal investigation of dropout from college in the United States. *Journal of College Student Retention: Research, Theory and Practice*, 4(2), 173–201. https://doi.org/10.2190/V4EN-NW42-742Q-2NTL
- James, R. (2002). Socioeconomic background and higher education participation: An analysis of school students' aspirations and expectations. Canberra: Department of Education, Science and Training.

- Johnson, D. (2008). How is variation in tuition across Canadian provinces related to university participation in the Youth in Transition Survey? In R. Finnie, R. E.
 Mueller, A. Sweetman, & A. Usher (Eds.), *Who goes? Who stays? What matters? Accessing and persisting in post-secondary education in Canada* (pp. 299–326).
 Montreal: School of Policy Studies, Queen's University, McGill-Queen's University Press.
- Johnson, J., Rochkind, J., Ott, A. N., & DuPont, S. (2009). With their whole lives ahead of them: Myths and realities about why so many students fail to finish college. New York, NY: Public Agenda.
- Johnstone, D. B. (1992). Tuition fees. In B. R. Clark & G. Neave (Eds.), *The encyclopedia of higher education* (Vol. 2, pp. 1501–1509). Oxford, UK: Pergamon.
- Johnstone, D. B. (2002). Challenges of financial austerity: Imperatives and limitations of revenue diversification in higher education. *The Welsh Journal of Education*, 11(1), 18–36.
- Johnstone, D. B. (2003). Cost-sharing in higher education: Tuition, financial assistance, and accessibility. *Czech Sociological Review*, *39*(3), 351–374.
- Johnstone, D. B. (2004a). The economics and politics of cost sharing in higher education: comparative perspectives. *Economics of Education Review*, *23*(4), 403–410.
- Johnstone, D. B. (2004b). The economics and politics of cost sharing in higher education: Comparative perspectives. *Economics of Education Review*, *20*(4), 403–410.
- Johnstone, D. B. (2008). The fragile college or university: An international perspective on the financial fragility of institutions and systems. In J. Martin, J. E. Samels, &

Associates (Eds.), *Turnaround: Leading Stressed Colleges and Universities to Excellence* (pp. 31–48). Baltimore, MD: Johns Hopkins University Press. Retrieved from

http://gse.buffalo.edu/org/inthigheredfinance/files/Publications/additional_papers/ (2009)_An_International_Perspective_on_the_financial_fragility_of_Institutions_ and_Systems.pdf

- Johnstone, D. B. (2009). Worlwide trends in financing higher education: A conceptual framework. In J. Knight (Ed.), *Financing access and equity in higher education*. Rotterdam, the Netherlands: Sense Publishers.
- Johnstone, D. B. (2013). US public universities in an era of continuing austerity: More of the same or profound change? Retrieved from http://gse.buffalo.edu/org/inthigheredfinance/files/Recent_Publications/USPublic UniversitiesInAnEraOfContinuingAusterity_MoreOfTheSameOrProfoundChange _Johnstone_2013.pdf
- Johnstone, D. B., & Marcucci, P. N. (2009). Tuition fee policies in a comparative perspective. In M. Tight, K. H. Mok, J. Huisman, & C. Morphew (Eds.), *The Routledge international handbook of higher education*. New York: Routledge.
- Johnstone, D. B., & Marcucci, P. N. (2010). *Financing higher education worldwide: who pays? who should pay?* Baltimore, MD: Johns Hopkins University Press.
- Kane, T. J. (1995). *Rising public college tuition and college entry: How well do public subsidies promote access to college?* (NBER Working paper Series No. 5164).
 Cambridge, MA: National Bureau of Economic Research.

- Kim, J. (2016). Why technology always increases costs for (quality) education. Retrieved from https://www.insidehighered.com/blogs/technology-and-learning/whytechnology-always-increases-costs-quality-education
- King, J. E. (1996). The decision to go to college: Attitudes and experiences associated with college attendance among low-income students (No. ED 398 775).Washington, DC: College Board.
- Kisilevsky, M., & Veleda, C. (2002). Dos estudios sobre el acceso a la educación superior en Argentina. UNESCO: Instituto Internacional de Planeamiento de la Educación. Retrieved from

http://unesdoc.unesco.org/images/0012/001295/129506s.pdf

- Knobel, M. (2014). Overview of the Brazilian higher education system. In *Argentina, Brazil, Chile: Engaging with the Southern Cone* (Vol. 4, pp. 12–14). Washington,
 D.C.: American Council in Education and center for International Higher Education.
- Knobel, M. (2015). The ENEM: A giant bottleneck for Brazil. Retrieved from https://www.insidehighered.com/blogs/world-view/enem-giant-bottleneck-brazil
- Kosmützky, A. (2015). In defence of international comparative studies. On the analytical and explanatory power of the nation state in international comparative higher education research. *European Journal of Higher Education*, *5*(4), 354–370. https://doi.org/10.1080/21568235.2015.1015107
- Kosmützky, A., & Krücken, G. (2014). Growth or steady state? A bibliometric focus on international comparative higher education research. *Higher Education*, 67(4), 457–472. https://doi.org/10.1007/s10734-013-9694-9

- Kosmützky, A., & Nokkala, T. (2014). Challenges and trends in comparative higher education: An editorial. *Higher Education*, 67(4), 369–380. https://doi.org/10.1007/s10734-013-9693-x
- Kuh, G. D., Kinzie, J., Buckley, J. A., Bridges, B. K., & Hayek, J. C. (2006). What matters to student success: A review of the literature. Washington, DC: National Postsecondary Education Cooperative. Retrieved from http://nces.ed.gov/npec/pdf/kuh_team_report.pdf
- Lamont, J., & Favor, C. (2013). Distributive Justice. Retrieved April 25, 2015, from http://plato.stanford.edu/entries/justice-distributive/
- Lavecchia, A. M., Liu, H., & Oreopoulos, P. (2014). Behavioral economics of education: *Progress and possibilities* (NBER Working Paper Series No. 20609). Cambridge, MA: National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w20609.pdf
- Leslie, L. L., & Brinkman, P. T. (1987). Student price response in higher education: The student demand studies. *The Journal of Higher Education*, 58(2), 181. https://doi.org/10.2307/1981241
- Levy, D. C. (1986). *Higher education and the state in Latin America: Private challenges to public dominance*. Chicago: University of Chicago Press.
- Levy, D. C. (2006). The private fit in the higher education landscape. In *International handbook of higher education* (pp. 281–291). Springer. Retrieved from http://link.springer.com/chapter/10.1007/978-1-4020-4012-2_14
- Levy, D. C. (2015). An international exploration of decline. *International Higher Education*, (61). https://doi.org/10.6017/ihe.2010.61.8515

- Lloyd, M. (2015). A decade of affirmative action in Brazil: Lessons for the global debate.
 In R. T. Teranishi, L. Bordoloi Pazich, M. Knobel, & W. R. Allen (Eds.),
 Advances in Education in Diverse Communities: Research, Policy and Praxis
 (Vol. 11, pp. 169–189). Emerald Group Publishing Limited. Retrieved from
 http://www.emeraldinsight.com/doi/10.1108/S1479-358X20150000011011
- Lor, P. J. (2018). *International and comparative librarianship* (De Gruyter Saur). Retrieved from https://pjlor.files.wordpress.com/2010/06/chapter-4-draft-2011-04-20.pdf
- Lusardi, A., & Mitchelli, O. (2007). Financial literacy and retirement preparedness: Evidence and implications for financial education. *Business Economics*, *42*(1), 35–44.
- MacAllum, K., Glover, D. M., Queen, B., & Riggs, A. (2007). *Deciding on* postsecondary education: Final report (No. NPEC 2008-850). Washington, DC: National Postsecondary Education Cooperative.
- Manifiesto: Una mirada crítica al sistema de admisión a las universidades públicas del Ecuador. (2015, October 22). Retrieved from

https://universidadsociedadec.wordpress.com/manifiesto-enes/

- Mankiw, N. G., Romer, D., & Weil, D. N. (1990). A contribution to the empirics of economic growth (NBER Working paper Series No. 3541). Cambridge, MA: National Bureau of Economic Research.
- Marcucci, P. N. (2013). The politics of student funding policies from a comparative perspective. In D. E. Heller & C. Callender (Eds.), *Student financing of higher*

education: a comparative perspective (pp. 9–31). New York: Routledge, Taylor & Francis Group.

- Marcucci, P. N., & Johnstone, D. B. (2007). Worldwide trends in higher education finance: Cost-sharing, student loans, and the support of academic research. *Journal of Higher Education Policy and Management*, 29(1), 25–40.
- Marcucci, P. N., Johnstone, D. B., & Ngolovoi, M. (2008). Higher educational costsharing, dual-track tuition fees, and higher educational access: The East African experience. *Peabody Journal of Education*, 83(1), 101–116.
- Marcucci, P. N., & Usher, A. (2012). 2011 year in review: Global changes in tuition fee policies and student financial assistance. Toronto: Higher Education Strategy Associates.
- Marginson, S. (2007). The public/private divide in higher education: A global revision. *Higher Education*, *53*(3), 307–333. https://doi.org/10.1007/s10734-005-8230-y
- Marginson, S. (2016). High participation systems of higher education. *The Journal of Higher Education*, 87(2), 243–271. https://doi.org/10.1353/jhe.2016.0007
- Marginson, S. (2017). The stratification of opportunity in high participation systems
 (HPS) of higher education. In A. Mountford-Zimdars & N. E. Harrison (Eds.),
 Access to higher education: theoretical perspectives and contemporary
 challenges (pp. 33–48). Abingdon, Oxon ; New York, NY: Routledge.
- Marshall, T. H. (1950). *Citizenship and social class and other essays*. London, UK: Cambridge University Press.

- Martin, J. F., & Montero, S. M. (2013). Estructura y titulaciones de educación superior en Argentina. Organizacion de Estados Iberoamericanos. Retrieved from http://www.oei.es/homologaciones/argentina.pdf
- Martin, R. E. (2011). *The college cost disease: Higher cost and lower quality*. Cheltenham, UK ; Northampton, MA: Edward Elgar.
- Martins, C. B. (2013). Reconfiguring higher education in Brazil: the participation of private institutions. *Análise Social*, *XLVIII*(3), 622–658.
- Marx, K., & Engels, F. (1848). *The communist manifesto*. London, UK: Communistischer Arbeiterbildungsverein.
- Maryland State Higher Education Commission. (1999). Survey of College Plans of Maryland High Ability Students (No. ED 436 989). Annapolis, MD: Author. Retrieved from https://archive.org/stream/ERIC_ED436989#page/n0/mode/2up
- McCowan, T. (2007). Expansion without equity: An analysis of current policy on access to higher education in Brazil. *Higher Education*, 53(5), 579–598. https://doi.org/10.1007/s10734-005-0097-4
- Metz, G. W. (2004). Challenge and changes to Tinto's persistence theory: A historical review. Journal of College Student Retention: Research, Theory & Practice, 6(2), 191–207. https://doi.org/10.2190/M2CC-R7Y1-WY2Q-UPK5
- Michaelowa, K. (2007). The impact of primary and secondary education on higher education quality. *Quality Assurance in Education*, 15(2), 215–236. https://doi.org/10.1108/09684880710748956
- Mill, J. S. (1843). *A system of logic: Ratiocinative and inductive*. Hawaii: University of the Pacific.

- Mincer, J. (1981). *Human capital and economic growth* (Working Paper No. 803). Cambridge, MA: National Bureau of Economic Research.
- Ministerio de Desarollo Social. (2015). Metodología de Diseño Muestral Encuesta de Caracterización Socioeconómica Nacional 2013 (Serie Documentos Metodológicos No. 30). Santiago, Chile: Author. Retrieved from http://observatorio.ministeriodesarrollosocial.gob.cl/documentos/Metodologia_Di seno_Muestral_Casen_2013.pdf
- Ministerio de Educacion. (2010). Historia. Retrieved October 27, 2016, from http://www.conicyt.cl/fondecyt/sobre-fondecyt/historia/
- Ministerio de Educacion. (2017). Lo que debes saber. Retrieved March 27, 2017, from http://www.gratuidad.cl/lo-que-debes-saber/
- Monroy, C., & Clark, N. (2012). Evaluating academic credentials from Brazil. Retrieved January 31, 2017, from http://wenr.wes.org/2012/03/wenr-march-2012evaluating-academic-credentials-from-brazil
- Moogan, Y. J., Baron, S., & Harris, K. (1999). Decision-Making Behaviour of Potential Higher Education Students. *Higher Education Quarterly*, 53(3), 211–228. https://doi.org/10.1111/1468-2273.00127
- Moreno, A. C., Tenente, L., & Luiz, G. (2015, May 8). Resultado do Enem 2014 por escola é divulgado pelo Inep; veja a lista. *Globo.com*. São Paulo. Retrieved from http://g1.globo.com/educacao/noticia/2015/08/resultado-do-enem-2014-porescola-e-divulgado-pelo-inep-veja-lista.html
- Morrison, J. A. (2015). Behind the numbers: Race and ethnicity in Latin America. *Americas Quarterly*, (Summer). Retrieved from

http://www.americasquarterly.org/content/behind-numbers-race-and-ethnicitylatin-america

- Mueller, R. E. (2008). Access and persistence of students from low-Income backgrounds in Canadian post-secondary education: A review of the literature (MESA Report Paper). Toronto, ON: Measuring the Effectiveness of Student Aid. Retrieved from http://www.ssrn.com/abstract=2256110
- Musgrave, R. A. (1959). *The theory of public finance: A study in public economy*. New York, NY: McGraw-Hill.
- Nascimento, C. de M., Mambrini, J. V. de M., de Oliveira, C. M., Giacomin, K. C., & Peixoto, S. V. (2015). Diabetes, hypertension and mobility among Brazilian older adults: Findings from the Brazilian National Household Sample Survey (1998, 2003 and 2008). *BMC Public Health*, *15*(1). https://doi.org/10.1186/s12889-015-1956-2
- Nkrumah-Young, K. K., Huisman, J., & Powell, P. (2008). The impact of funding policies on higher education in Jamaica. *Comparative Education*, *44*(2), 215–227. https://doi.org/10.1080/03050060802041209
- Off the map. (2014, November 15). *The Economist*. Retrieved from http://www.economist.com/news/international/21632520-rich-countries-aredeluged-data-developing-ones-are-suffering-drought
- Oosterbeek, H., & Webbink, D. (1995). Enrolment in higher education in the Netherlands. *De Economist*, *143*(3), 367–380.
- Organisation for Economic Co-operation and Development. (2014a). *Education at a glance 2014: OECD indicators*. Paris, France: Author.

- Organisation for Economic Co-operation and Development (Ed.). (2014b). *What students know and can do: student performance in mathematics, reading and science* (Rev. ed., Febr. 2014). Paris: OECD.
- Organisation for Economic Co-operation and Development. (2016). *Education at a glance 2016*. OECD Publishing. Retrieved from http://www.oecd-ilibrary.org/education/education-at-a-glance-2016_eag-2016-en
- Otner, S. M. G. (2012). Most different systems design. In A. J. Mills, G. Durepos, & E. Wiebe (Eds.), *Encyclopedia of case study research* (pp. 571–572). Thousand Oaks: SAGE. Retrieved from http://methods.sagepub.com/Reference/encyc-of-case-study-research/n211.xml
- Pascarella, E. T., & Terenzini, P. T. (1991). How college affects students: Findings and insights from twenty years of research (1st ed). San Francisco: Jossey-Bass Publishers.
- Paulsen, M. B. (1990). College choice: understanding student enrollment behavior.Washington, DC: School of Education and Human Development, GeorgeWashington University.
- Paulsen, M. B. (1998). Recent research on the economics of attending college: Returns on investment and responsiveness to price. *Research in Higher Education*, *39*(4), 471–489.
- Paulsen, M. B., & St. John, E. P. (2002). Social class and college cost: Examining the financial nexus between college choice and persistence. *The Journal of Higher Education*, 73(2), 189–236. https://doi.org/10.1353/jhe.2002.0023

- Penchansky, R., & Thomas, J. W. (1981). The concept of access: Definition and relationship to consumer satisfaction. *Medical Care*, *19*(2), 127–140.
- Peng, C.-Y. J., Lee, K. L., & Ingersoll, G. M. (2002). An introduction to logistic regression analysis and reporting. *The Journal of Educational Research*, 96(1), 3– 14. https://doi.org/10.1080/00220670209598786
- Peracchi, F., & Welch, F. (1994). Trends in labor force transitions of older men and women. *Journal of Labor Economics*, *12*(2), 210–242.
- Perna, L. W. (2006). Studying college access and choice: A proposed conceptual model.
 In J. C. Smart (Ed.), *Higher education: handbook of theory and research* (Vol. XXI, pp. 99–157). Dordrecht, Netherlands: Springer.
- Perna, L. W. (2010). Toward a more complete understanding of the role of financial aid in promoting college enrollment: The importance of context. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 25, pp. 129–179).
 Dordrecht: Springer Netherlands. Retrieved from http://www.springerlink.com/index/10.1007/978-90-481-8598-6_4
- Perna, L. W., & Titus, M. A. (2004). Understanding differences in the choice of college attended: The role of state public policies. *The Review of Higher Education*, 27(4), 501–525. https://doi.org/10.1353/rhe.2004.0020
- Phipps, R., & Merisotis, J. (2000). Quality on the line: Benchmark for success in internetbased distance education (No. ED 444 407). Washington, DC: Institute for Higher Education Policy.

- Pierson, P. (2002). Coping with permanent austerity: Welfare state restructuring in affluent democracies. *Revue Française de Sociologie*, 43(2), 369. https://doi.org/10.2307/3322510
- Post, D. (2011). Who will pay and who benefits from Ecuador's new free higher education? *International Higher Education*, (65), 20–22.
- Power, E. J. (1982). *Philosophy of education: studies in philosophies, schooling, and educational policies*. Englewood Cliffs, N.J: Prentice-Hall.
- Psacharopoulos, G. (1994). Returns to investment in education: A global update. *World* Development, 22(9), 1325–1343.
- Psacharopoulos, G., & Papakonstantinou, G. (2005). The real university cost in a "free" higher education country. *Economics of Education Review*, *24*(1), 103–108.
- Psacharopoulos, G., & Patrinos, H. A. (2002). *Returns to investment in education: A further update* (Policy research Working Paper No. 2881). Washington, DC: World Bank.
- Pusser, B. (2002). Higher education, the emerging market, and the public good. In P. A. Graham & N. C. Stacey (Eds.), *The knowledge economy and postsecondary education: Report of a workshop* (pp. 105–125). National Academies Press Washington, DC.
- Putnam, R. (2001). Social capital: Measurement and consequences. *Canadian Journal of Policy Research*, 2(1), 41–51.
- Rabossi, M. (2013). The public university in Argentina: Both inefficient and ineffective? *International Higher Education*, (71), 23–24.

- Raisman, N. A. (2013). *The cost of college attrition at four year colleges & universities*(Policy Perspectives). Virginia Beach, VA: Educational Policy Institute.
- Raposo, M., & Alves, H. (2007). A model of university choice: An exploratory approach (Munich Personal RePEc Archive Paper No. 5523). Covilhã, Portugal: University ob Beira Interior.
- Rawls, J. (1999). *A theory of justice Revised edition*. Cambridge, MA: Belknap Press of Harvard University Press.
- Reason, R. D. (2009). An examination of persistence research through the lens of a comprehensive conceptual framework. *Journal of College Student Development*, 50(6), 659–682. https://doi.org/10.1353/csd.0.0098
- Rosenstone, S. J., & Hansen, J. M. (1993). *Mobilization, participation, and democracy in America*. New York, NY: Macmillan.
- Ross, T., Kena, G., Rathbun, A., KewalRamani, A., Zhang, J., Kristapovich, P., & Manning, E. (2012). *Higher education: Gaps in access and persistence study*.
 (No. NCES 2012-046). Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Salto, D. J. (2014). Brazil: A for-profit giant. *International Higher Education*, (74), 21–22.
- Samuelson, P. A. (1954). The pure theory of public expenditure. *The Review of Economics and Statistics*, *36*(4), 387. https://doi.org/10.2307/1925895
- Savitz-Romer, M., & Bouffard, S. M. (2012). *Ready, willing, and able: A developmental approach to college access and success*. Cambridge, Mass: Harvard Education Press.
- Schmidtlein, F. A., & Berdahl, R. O. (2011). Autonomy and accountability: who controls academe? In P. G. Altbach, P. J. Gumport, & R. O. Berdahl (Eds.), *American higher education in the twenty-first century: Social, political, and economic challenges* (3rd ed, pp. 69–87). Baltimore, MD: Johns Hopkins University Press.
- Schultz, T. W. (1961). Investment in human capital. *The American Economic Review*, *51*(1), 1–17.
- Schwartzman, S. (1991). The future of higher education in Brazil. Presented at the XVI International Congress, Latin American Studies Association, Washington, D.C. Retrieved from http://www.schwartzman.org.br/simon/pdf/future_english.pdf
- Schwartzman, S. (1993). Policies for higher education in Latin America: The context. *Higher Education*, 25(1), 9–20. https://doi.org/10.1007/BF01384038

Schwartzman, S. (2001, August). Higher education reform: Indonesia and Latin America. Presented at the International Higher Education Reform, Jakarta, Indonesia. Retrieved from http://www.schwartzman.org.br/simon/jakarta.htm#fn1

Schwartzman, S. (2015, October 17). O impasse do ensino médio e o funil do ENEM. Retrieved from http://www.schwartzman.org.br/sitesimon/?p=5289&lang=en-us

Secretaría de Políticas Universitarias. (2013). Anuario de estadísticas universitarias Argentina 2013. Buenos Aires: Departamento de Información Universitaria, de la
 Secretaría de Políticas Universitarias. Retrieved from
 http://informacionpresupuestaria.siu.edu.ar/DocumentosSPU/Anuario 2013.pdf

Sewell, W. H., & Shah, V. P. (1968). Parents' education and children's educational aspirations and achievements. *American Sociological Review*, 33(2), 191. https://doi.org/10.2307/2092387

- Shaw, E. J., Kobrin, J. L., Packman, S. F., & Schmidt, A. E. (2009). Describing students involved in the search phase of the college choice process: A cluster analysis study. *Journal of Advanced Academics*, 20(4), 662–700.
- Simões, C., & Soares, A. M. (2010). Applying to higher education: information sources and choice factors. *Studies in Higher Education*, 35(4), 371–389. https://doi.org/10.1080/03075070903096490
- Smith, A. (1776). *An inquiry into the nature and causes of the wealth of nations*. Chicago: University of Chicago Press.
- Smith, A. A. (2015, September 9). Obama steps up push for free. *Inside Higher Ed.* Retrieved from https://www.insidehighered.com/news/2015/09/09/obamaunveils-new-push-national-free-community-college
- Socioeconomic status. (2003). In *International Encyclopedia of Marriage and Family*. Encyclopedia.com. Retrieved from http://www.encyclopedia.com/doc/1G2-3406900411.html
- Somers, P., Cofer, J., & VanderPutten, J. (2002). The early bird goes to college: The link between early college aspirations and postsecondary matriculation. *Journal of College Student Development*, 43(1), 93–107.
- Statistics Division of the Department of Economic and Social Affairs. (2005). *Designing household survey samples: Practical guidelines* (F No. 98). New York, NY: United Nations. Retrieved from

https://unstats.un.org/unsd/demographic/sources/surveys/Handbook23June05.pdf

Stiglitz, J. E. (1999). Knowledge as a global public good. In I. Kaul, I. Grunberg, & M.
A. Stern (Eds.), *Global public goods: International cooperation in the 21st century* (pp. 308–324). New York, NY: Oxford University Press.

Stocco Ranieri, N. B. (2010). States and the right to education in the 1988 Constitution:
Comments on Federal Supreme Court jurisprudence. In S. Righetti (Ed.), *Right to education: Constitucional aspects* (pp. 37–56). Sao Paulo: Editora da
Universidade de Sao Paulo. Retrieved from http://unesdoc.unesco.org/images/0018/001879/187916e.pdf

Swail, W. S., & Heller, D. E. (2004). Changes in tuition policy: Natural policy experiments in five countries. Montreal, Canada: The Canada Millennium Scholarship Foundation. Retrieved from http://www.educationalpolicy.org/pdf/tuitionpolicy.pdf

Taylor, M. (2014, November 19). Student protest over tuition fees ends in scuffles with police. *The Guardian*. Retrieved from http://www.theguardian.com/education/2014/nov/19/student-protest-tuition-feesscuffles-police

- Teixeira, P. N., Johnstone, D. B., Vossensteyn, H., & Rosa, M. J. (2008). Conclusion. In
 P. N. Teixeira, D. B. Johnstone, M. J. Rosa, & H. Vossensteyn (Eds.), *Cost-sharing and accessibility in higher education: a fairer deal?* (pp. 343–356).
 Berlin: Springer.
- Tennessee Higher Education Commission. (2008). *High school senior opinion survey*. Nashville, TN: Author.

- Terenzini, P. T., & Reason, R. D. (2005, November). Parsing the rst year of college: Rethinking the effects of college on students. Presented at the Annual Conference of the Association for the Study of Higher Education, Philadelphia, PA.
- Tierney, W. G. (1992). *Official encouragement, institutional discouragement: minorities in academe - the Native American experience*. Norwood, N.J: Ablex Pub. Corp.
- Tilak, J. B. G. (2004). Higher education between the state and the market. Presented at the UNESCO Forum on Higher Education, Research and Knowledge, Paris, France.
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research*, *45*(1), 89–125.
- Tjur, T. (2009). Coefficients of Determination in Logistic Regression Models—A New Proposal: The Coefficient of Discrimination. *The American Statistician*, 63(4), 366–372. https://doi.org/10.1198/tast.2009.08210
- Travitzki, R., Calero, J., & Boto, C. (2014). What does the national high school exam (enem) tell Brazilian society? *CEPAL Review*, (113), 157–174.
- Trow, M. (1973). *Problems in the transition from elite to mass higher education* (No. ED 091 983). Berkeley, CA: Carnegie Commission on Higher Education.
- Trow, M. (2006). Reflections on the transition from elite to mass to universal access forms and phases of higher education in modern societies since WWII. In J. J. F. Forest & P. G. Altbach (Eds.), *International handbook of higher education* (pp. 83–106). Dordrecht, the Netherlands: Springer.
- Turner, S. (2004). Going to college and finishing college. Explaining different educational outcomes. In C. M. Hoxby (Ed.), *College choices: The economics of*

where to go, when to go, and how to pay for it (pp. 13–61). Chicago: University of Chicago Press.

- UNESCO Institute for Statistics. (2011). Education. Retrieved October 26, 2016, from http://data.uis.unesco.org/Index.aspx?DataSetCode=EDULIT_DS&popupcustomi se=true&lang=en
- UNESCO Institute for Statistics. (2012). Education. Retrieved November 21, 2016, from http://data.uis.unesco.org/Index.aspx?DataSetCode=EDULIT_DS&popupcustomi se=true&lang=en
- UNESCO Institute for Statistics. (2013). Education. Retrieved October 26, 2016, from http://data.uis.unesco.org/Index.aspx?DataSetCode=EDULIT_DS&popupcustomi se=true&lang=en
- United Nations, Department of Economic and Social Affairs, Population Division. (2014). *World urbanization prospects: The 2014 revisions, highlights* (No. ST/ESA/SER.A/352).
- Universidad de Chile. (2009). Historia del examen de admision. Retrieved October 26, 2016, from http://www.uchile.cl/portal/presentacion/asuntos-academicos/demre/presentacion/110237/historia-del-examen-de-admision
- Usher, A. (2016, March 13). A typology of "free tuition." Retrieved from https://www.insidehighered.com/blogs/world-view/typology-%E2%80%9Cfreetuition%E2%80%9D
- Usher, A., & Medow, J. (2010). *Global higher education rankings 2010: Affordability and accessibility in comparative perspective*. Toronto: Higher Education Strategy

Associates. Retrieved from http://higheredstrategy.com/wpcontent/uploads/2011/09/GHER2010_FINAL.pdf

- Uslaner, E. M. (n.d.). *Civic engagement in America: Why people participate in political and social Life*. College Park, MD: Knight Civic Engagement Project, The Democracy Collaborative at the University of Maryland, and the Centre for the Study of Voluntary Organizations and Service at Georgetown University.
- Vabø, A., & Wiers-Jenssen, J. (2015). Different approaches to fees for international students. University World News, (361).
- Villanueva, E. (2007). Transnational commercial provision of higher education: the case of Argentina. In M. Martin (Ed.), *Cross-border higher education: regulation, quality assurance and impact. Argentina, Kenya, Russia.* (Vol. II). Paris: International Institute for Education Planning. Retrieved from http://unesdoc.unesco.org/images/0015/001578/157899e.pdf
- Vossensteyn, H. (2009). Challenges in student financing: State financial support to students – A worldwide perspective. *Higher Education in Europe*, *34*(2), 171– 187. https://doi.org/10.1080/03797720902867294
- Vossensteyn, H., & Canton, E. (2001). Tuition fees and accessibility: the Australian HECS. In E. Canton, *Higher education reform: getting the incentives right* (pp. 53–66). Den Haag: Sdu Uitgevers.
- Vrontis, D., Thrassou, A., & Melanthiou, Y. (2007). A contemporary higher education student-choice model for developed countries. *Journal of Business Research*, 60(9), 979–989. https://doi.org/10.1016/j.jbusres.2007.01.023

- Weisbrod, B. A., & Asch, E. D. (2010). The truth about the "crisis" in higher education finance. *Change: The Magazine of Higher Learning*, *42*(1), 23–29.
- West, C. (2013). To charge or not to charge? That is tuition. *International Educator*, 22(4), 34–43.
- Wiener, B. (n.d.). The development and privatization of tertiary education in Brazil: Uma novela dramática. Presented at the International Development, University of Minnesota. Retrieved from

http://www.academia.edu/1705286/The_Development_and_Privatization_of_Tert iary_Education_In_Brazil_Uma_Novela_Dramatica

- Wildavsky, B. (2010, November 11). Why Brazil's standardized entrance test deserves to be salvaged. Retrieved from http://www.chronicle.com/blogs/worldwise/whybrazils-standardized-entrance-test-deserves-to-be-salvaged/27577
- Wilkins, S., Shams, F., & Huisman, J. (2013). The decision-making and changing behavioural dynamics of potential higher education students: The impacts of increasing tuition fees in England. *Educational Studies*, 39(2), 125–141.
- Woolley, F. (2006). *Why public goods are a pedagogical bad* (No. 907381). Social Science Research Network. Retrieved from

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=907381

- World Bank. (2013). Net enrolment rate, secondary, both sexes (%). Retrieved February 7, 2017, from http://data.worldbank.org/indicator/SE.SEC.NENR
- World Policy Analysis Center. (2017). Is education tuition-free? Retrieved February 20, 2017, from http://www.worldpolicycenter.org/policies/is-education-tuition-free/is-primary-education-tuition-free

APPENDIX

Appendix Table 1. Distribution of household income per capita by parental education for Chile for the participation sample (percentage).

Quintile of	Less than high	High school	Some college	College
income	school graduation	graduation		graduation
Lowest	9.96	5.23	0.57	0.59
Second	10.66	7.69	0.58	1.13
Third	10.28	8.58	0.81	1.96
Fourth	8.04	9.27	1.08	3.88
Highest	3.22	5.86	1.22	9.32

Appendix Table 2. Distribution of household income per capita by parental education for Argentina for the participation sample (percentage).

Quintile of income	Less than high school graduation	High school graduation	Some college	College graduation
Lowest	7.82	4.40	1.95	1.29
Second	9.43	5.77	2.70	3.12
Third	7.98	6.89	3.12	5.31
Fourth	5.36	6.20	3.08	7.77
Highest	2.54	4.16	1.96	9.16

Appendix Table 3. Distribution of household income per capita by parental education for Brazil for the participation sample (percentage).

Quintile of income	Less than high school graduation	High school graduation	Some college	College graduation
Lowest	4.44	2.99	0.42	0.69
Second	6.36	5.58	0.71	1.30
Third	7.09	7.93	1.01	2.75
Fourth	7.13	10.97	1.95	5.76
Highest	2.54	7.53	1.86	13.83

Appendix Table 4. Distribution of household income per capita by parental education for Chile for the college choice sample (percentage).

Quintile of income	Less than high school graduation	High school graduation	Some college	College graduation
Lowest	6.65	5.42	0.89	0.79
Second	7.25	8.19	0.93	1.65
Third	6.94	9.04	1.01	2.94
Fourth	5.30	9.47	1.51	5.84
Highest	2.58	6.46	1.89	15.24

Quintile of income	Less than high school graduation	High school graduation	Some college	College graduation
Lowest	5.18	4.03	2.56	1.70
Second	6.83	5.40	3.51	4.23
Third	5.57	6.61	4.07	7.14
Fourth	3.61	5.32	3.93	10.55
Highest	1.51	3.54	2.34	12.37

Appendix Table 5. Distribution of household income per capita by parental education for Argentina for the college choice sample (percentage).

Appendix Table 6. Distribution of household income per capita by parental education for Brazil for the college choice sample (percentage).

Quintile of income	Less than high school graduation	High school graduation	Some college	College graduation
Lowest	1.41	1.6	0.46	0.7
Second	2.58	3.33	0.73	1.42
Third	4.03	6.37	1.24	3.34
Fourth	5.05	10.93	2.75	8.88
Highest	2.69	10.36	3.57	28.55

Regions	Individuals
I: Tarapacá	1,872 (5.35%)
Ii: Antofagasta	2,043 (5.84%)
Iii: Atacama	1,478 (4.23%)
Iv: Coquimbo	1,681 (4.81%)
V: Valparaíso	3,171 (9.07%)
Vi: Libertador General Bernardo O'higgins	2,230 (6.38%)
Vii: Maule	2,447 (7%)
Viii: Bío Bío	4,392 (12.56%)
Ix: La Araucanía	2,412 (6.9%)
X: Los Lagos	1,927 (5.51%)
Xi: Aysén Del General Carlos Ibáñez Del	
Campo	939 (2.69%)
Xii: Magallanes y de La Antártica Chilena	938 (2.68%)
R.M.: Metropolitana de Santiago	5,835 (16.69%)
Xiv: Los Ríos	2,059 (5.89%)
Xv: Arica Y Parinacota	1,539 (4.4%)

Appendix Table 7. Distribution of individuals per region in Chile for the participation sample.

Regions	Individuals
Gran La Plata	672 (2.52%)
Bahía Blanca - Cerri	545 (2.04%)
Gran Rosario	1,049 (3.94%)
Gran Santa Fé	734 (2.75%)
Gran Paraná	678 (2.54%)
Posadas	765 (2.87%)
Gran Resistencia	838 (3.14%)
Cdro. Rivadavia – Rada Tilly	418 (1.57%)
Gran Mendoza	966 (3.62%)
Corrientes	1,111 (4.17%)
Gran Córdoba	1,184 (4.44%)
Concordia	539 (2.02%)
Formosa	925 (3.47%)
Neuquén – Plottier	566 (2.12%)
S.Del Estero - La Banda	877 (3.29%)
Jujuy - Palpalá	821 (3.08%)
Río Gallegos	396 (1.49%)
Gran Catamarca	1,115 (4.18%)
Salta	1,152 (4.32%)
La Rioja	1,208 (4.53%)
San Luis - El Chorrillo	781 (2.93%)
Gran San Juan	720 (2.7%)
Gran Tucumán - T. Viejo	1,202 (4.51%)
Santa Rosa - Toay	344 (1.29%)
Ushuaia - Río Grande	601 (2.25%)
Ciudad De Buenos Aires	874 (3.28%)
Partidos Del Gba	2,819 (10.58%)
Mar Del Plata - Batán	570 (2.14%)
Río Cuarto	541 (2.03%)
San Nicolás – Villa Constitución	605 (2.27%)
Rawson – Trelew	548 (2.06%)
Viedma – Carmen De Patagones	493 (1.85%)

Appendix Table 8. Distribution of individuals per region in Argentina for the participation sample.

Regions	Individuals
Rondônia	503 (1.42%)
Acre	384 (1.08%)
Amazonas	1,141 (3.22%)
Roraima	303 (.86%)
Pará	2,002 (5.65%)
Amapá	357 (1.01%)
Tocantins	543 (1.53%)
Maranhão	757 (2.14%)
Piauí	431 (1.22%)
Ceará	2,085 (5.89%)
Rio grande do norte	481 (1.36%)
Paraíba	536 (1.51%)
Pernambuco	1,971 (5.57%)
Alagoas	429 (1.21%)
Sergipe	523 (1.48%)
Bahia	2,241 (6.33%)
Minas gerais	3,428 (9.68%)
Espírito santo	702 (1.98%)
Rio de janeiro	2,407 (6.8%)
São paulo	4,901 (13.84%)
Paraná	1,858 (5.25%)
Santa catarina	1,066 (3.01%)
Rio grande do sul	2,481 (7.01%)
Mato grosso do sul	552 (1.56%)
Mato grosso	679 (1.92%)
Goiás	1,456 (4.11%)
Distrito federal	1,186 (3.35%)

Appendix Table 9. Distribution of individuals per region in Brazil for the participation sample.

$$(1) \log\left(\frac{higher_ed}{1-higher_ed}\right)$$

$$= \alpha + \beta_1 \times arg + \beta_2 \times br + \sum_{i=2}^5 \beta_{3 to 6} \times inc_i$$

$$+ \sum_{i \in \{1,3,4\}} \beta_{7 to 9} \times par_ed_i + \sum_{i=2}^9 \beta_{10 to 18} \times year_i$$

$$+ arg$$

$$\times \left(\sum_{i=2}^5 \beta_{3 to 6,arg} \times inc_i + \sum_{i \in \{1,3,4\}} \beta_{7 to 9,arg} \times par_ed_i$$

$$+ \sum_{i=2}^9 \beta_{10 to 18,arg} \times year_i\right)$$

$$+ br$$

$$\times \left(\sum_{i=2}^5 \beta_{3 to 6,br} \times inc_i + \sum_{i \in \{1,3,4\}} \beta_{7 to 9,br} \times par_ed_i$$

$$+ \sum_{i=2}^9 \beta_{10 to 18,br} \times year_i\right) + \beta_{19} \times female + \varepsilon$$

$$(2) \log\left(\frac{ihe}{1-ihe}\right)$$

$$= \alpha + \beta_1 \times arg + \beta_2 \times br + \sum_{i=2}^5 \beta_{3 \ to \ 6} \times inc_i$$

$$+ \sum_{i \in \{1,3,4\}} \beta_{7 \ to \ 9} \times par_ed_i + \sum_{i=2}^9 \beta_{10 \ to \ 18} \times year_i$$

$$+ arg$$

$$\times \left(\sum_{i=2}^5 \beta_{3 \ to \ 6,arg} \times inc_i + \sum_{i \in \{1,3,4\}} \beta_{7 \ to \ 9,arg} \times par_ed_i$$

$$+ \sum_{i=2}^9 \beta_{10 \ to \ 18,arg} \times year_i\right)$$

$$+ br$$

$$\times \left(\sum_{i=2}^5 \beta_{3 \ to \ 6,br} \times inc_i + \sum_{i \in \{1,3,4\}} \beta_{7 \ to \ 9,br} \times par_ed_i$$

$$+ \sum_{i=2}^9 \beta_{10 \ to \ 18,br} \times year_i\right) + \beta_{19} \times female + \varepsilon$$

$$(3) \log\left(\frac{h(t_{i})}{1-h(t_{j})}\right)$$

$$= \sum_{i=1}^{6} \propto_{i} acy_{i} + \beta_{1} \times arg + \beta_{2} \times br + \sum_{i=2}^{5} \beta_{3 to 6} \times inc_{i}$$

$$+ \sum_{i \in \{1,3,4\}} \beta_{7 to 9} \times par_{-}ed_{i} + \sum_{i=2}^{9} \beta_{10 to 18} \times year_{i}$$

$$+ arg$$

$$\times \left(\sum_{i=1}^{6} \propto_{i,arg} acy_{i} + \sum_{i=2}^{5} \beta_{3 to 6,arg} \times inc_{i}$$

$$+ \sum_{i \in \{1,3,4\}} \beta_{7 to 9,arg} \times par_{-}ed_{i} + \sum_{i=2}^{9} \beta_{10 to 18,arg} \times year_{i}\right)$$

$$+ br$$

$$\times \left(\sum_{i=1}^{6} \alpha_{i,br} acy_{i} + \sum_{i=2}^{5} \beta_{3 to 6,br} \times inc_{i}$$

$$+ \sum_{i \in \{1,3,4\}} \beta_{7 to 9,br} \times par_{-}ed_{i} + \sum_{i=2}^{9} \beta_{10 to 18,br} \times year_{i}\right)$$

$$+ \beta_{19} \times female + \varepsilon$$

	Participation	College Choice
Quintile of per capita income		
Second	1.0903**	1.0168
	(0.0449)	(0.0653)
Third	1.1501^{***}	1.0365
	(0.0468)	(0.0658)
Fourth	1.2376***	1.1776***
	(0.0511)	(0.0741)
Highest	1.8937***	1.1121
6	(0.0888)	(0.0726)
Parental education	()	
Less than High school graduate	0.4628^{***}	1.4063^{***}
<u> </u>	(0.0129)	(0.0629)
Some college	2 5997***	0 6911
Some conege	(0.1945)	(0.0539)
College graduate	2 9946***	0.6839***
Conege graduate	(0.1343)	(0.0325)
Vear of hirth	(0.1545)	(0.0525)
	0.0122	1 0002
1988	(0.9133)	(0.1121)
1020	(0.0382) 1.1004*	(0.1151)
1989	1.1006	1.0048
1000	(0.0607)	(0.0945)
1990	1.1180	1.1782
1001	(0.0607)	(0.1025)
1991	1.0321	1.1819
	(0.0562)	(0.1020)
1992	0.9474	1.1006
	(0.0521)	(0.0955)
1993	0.7703	1.1792
	(0.0438)	(0.1054)
1994	0.7543^{***}	1.0300
	(0.0482)	(0.0995)
1995	0.2701^{***}	0.9989
	(0.0211)	(0.1198)
Gender		
Female	1.6461***	1.1610^{***}
	(0.0260)	(0.0278)
Country		
Argentina	0.8724	0.0914***
	(0.0844)	(0.0149)
Brazil	0 1727***	0 7715
Diuzii	(0.0162)	(0.1359)
Argenting x Quintile of per capita income	(0.0102)	(0.1557)
Second	1 0552	1 3000**
Scona	(0.0605)	(0.1492)
Third	(0.0093)	(0.1402) 1.6067***
111114	1.0/33	1.000/
Frendt	(0.0/13)	(0.1809)
Fourth	0.9659	$\frac{1.7117}{(0.1014)}$
	(0.0663)	(0.1914)

Appendix Table 10. Odds ratio for the combined models for participation and college choice

Highest	0.7229^{***}	2.1923***
e	(0.0558)	(0.2557)
Brazil x Quintile of per capita income		
Second	1.1475^{*}	1.6550****
	(0.0893)	(0.2357)
Third	1.6270***	2.0016***
	(0.1200)	(0.2661)
Fourth	2.3017***	2.5239***
	(0.1658)	(0.3245)
Highest	3.8678***	2.7706^{***}
	(0.2956)	(0.3571)
Argentina x Parental education		
Less than High school graduate	1.3017***	0.5536^{***}
	(0.0678)	(0.0507)
Some college	1.1414	1.5111****
	(0.1133)	(0.1732)
College graduate	1.3005****	1.6291***
	(0.0937)	(0.1366)
Brazil x Parental education		
Less than High school graduate	1.3096***	0.7161***
	(0.0583)	(0.0596)
Some college	0.6230***	1.1793
	(0.0567)	(0.1378)
College graduate	0.8132***	1.0037
	(0.0459)	(0.0734)
Argentina x Year of birth		
1988	1.1043	1.0786
	(0.1122)	(0.1792)
1989	0.8818	1.0275
	(0.0803)	(0.1516)
1990	0.8923	1.0336
	(0.0796)	(0.1490)
1991	1.0530	0.9460
	(0.0938)	(0.1357)
1992	1.1227	0.9489
	(0.1017)	(0.1357)
1993	1.4066***	0.8298
	(0.1311)	(0.1221)
1994	1.5476***	0.8069
	(0.1656)	(0.1339)
1995	4.1649***	0.7364
	(0.5075)	(0.1387)
Brazil x Year of birth		
1988	1.0440	0.8563
	(0.0955)	(0.1482)
1989	0.8929	0.7650^{*}
	(0.0713)	(0.1154)
1990	0.9089	0.7563^{*}
	(0.0717)	(0.1119)
1991	0.9873	0.7381**
	(0.0782)	(0.1077)

1992	0.9450	0.8172
	(0.0755)	(0.1198)
1993	1.0000	0.8152
	(0.0823)	(0.1223)
1994	1.1403	0.9464
	(0.1059)	(0.1533)
1995	2.5359***	1.0558
	(0.2728)	(0.1937)
Constant	1.0100	1.4062***
	(0.0595)	(0.1329)
Tiur's D	0.1925	0.2143

Note: The first column is the model for higher education participation with an outcome of 0 if there is no participation and 1 if there is participation. The second column is the model for college choice with an outcome of 0 for the public sector and 1 for the private sector.

The base for quintile of per capita income is the lowest, i.e. the 20 percent poorest households in the country. The base for parental education is high school graduation. The base for birth cohort is 1987 and the base for gender is male. In these combined models, Chile is the base for the country variable. * p<0.1 ** p<0.05 *** p<0.01

	Participation
Quintile of per capita income	
Second	0.9708
	(0.1009)
Third	1.0996
	(0.1091)
Fourth	1.2458**
	(0.1205)
Highest	0.9344
	(0.1006)
Parental education	
Less than High school graduate	1.3714***
6 6	(0.0894)
Some college	1.0640
	(0.1222)
College graduate	0.5027***
Conege Bradaile	(0.0471)
Year of birth	
1988	0 8205
1,00	(0.1086)
1989	0.9157
1,0,	(0.1017)
1990	0.6508***
1990	(0.0745)
1991	0.6257***
1991	(0.0237)
1992	(0.0738)
	(0.0042)
1993	0.4666***
	(0.0671)
1994	(0.0071)
	(0.0875)
1995	(0.0873)
	0.4219
	(0.1419)
Gender	A 7777***
Female	(0.0282)
A 1 • X7	(0.0282)
Academic Year	0 0 <i>c</i> 2 <i>c</i> ***
1	0.0535
2	(0.00/0)
	0.0649
	(0.0085)
3	0.0460
	(0.0064)
4	0.0346
	(0.0057)
5	0.0484***
	(0.0103)
6	0.0616***
	(0.0324)

Appendix Table 11. Odds ratio for the combined models for attrition

Country	
Argentina	0.4995
	(0.3707)
Brazil	3.1288*
	(1.9403)
Argenting x Quintile of ner canita income	(1.9 105)
Second	0 0080
Second	(0.1570)
	(0.1570)
Inird	0.95/8
	(0.1444)
Fourth	0.8730
	(0.1326)
Highest	1.3675^{*}
	(0.2240)
Brazil x Quintile of per capita income	
Second	1 3014
	(0.3149)
Third	1 3782
Timu	(0.2082)
	(0.3083)
Fourth	1.1221
	(0.2427)
Highest	1.2212
	(0.2713)
Argentina x Parental education	
Less than High school graduate	1.2396**
	(0.1337)
Some college	0.7032^{**}
	(0.1121)
College graduate	0.9891
Conege graduate	(0.1347)
Drazil y Devental advection	(0.1347)
Drazn x r arental education	0.00(2*
Less than High school graduate	0.8062
a	(0.0926)
Some college	0.7118
	(0.1225)
College graduate	1.3414**
	(0.1692)
Argentina x Year of birth	
1988	0.9462
	(0.1912)
1989	1 1361
1,0,	(0.1897)
1990	1 31/2
1770	(0.2260)
1001	(0.2200)
1991	1.1491
1000	(0.2046)
1992	0.9422
	(0.1781)
1993	1.4251
	(0.3054)
1994	1.2833

	(0.3611)
1995	0.9159
	(0.4356)
Brazil x Year of birth	
1988	0.9984
	(0.2123)
1989	0.9722
	(0.1776)
1990	1.0889
	(0.2022)
1991	1.1494
	(0.2163)
1992	1.0216
1000	(0.1993)
1993	1.7787
1004	(0.3832)
1994	1.8288
1005	(0.4809)
1995	1.5354
Augentine v Acadamie Veer	(0.0343)
Argentina x Academic Tear	0.9710
1	(0.7096)
2	1 1910
2	(0.8707)
3	2.5434
-	(1.8646)
4	3.0743
	(2.2835)
5	1.5732
	(1.2138)
6	1.0000
	(.)
Brazil x Academic Year	***
1	0.2021
	(0.1188)
2	0.2280
2	(0.1339)
3	0.5169
4	(0.3048)
4	0.5448
5	(0.3282)
5	0.0344
6	1 0000
U U	()
BIC	28 372

Note: The base for quintile of per capita income is the lowest, i.e. the 20 percent poorest households in the country. The base for parental education is high school graduation. The base for birth cohort is 1987 and the base for gender is male. In this combined model, Chile is the base for the country variable. * p<0.1 ** p<0.05 *** p<0.01