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# Privileging the Privileged: The Effects of International University Rankings on a Chilean Fellowship Program for Graduate Studies Abroad

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**Abstract:** In the last few decades, many developing countries have dramatically expanded the number of government-sponsored fellowships for graduate studies abroad to increase their participation in the knowledge economy. To award these grants, these programs have typically relied on international university rankings as their main selection criterion. Existing studies suggest these fellowships have been disproportionally awarded to applicants from privileged social backgrounds, thus intensifying existing national educational inequalities. However, this evidence is mostly anecdotal and descriptive in nature. In this article, we focus on a Chilean fellowship program, an iconic example of these policies. Using a causal path analysis mediation model and relying on social reproduction and stratification theories, we investigated whether the distribution of fellowships varied across applicants from different socioeconomic backgrounds and how university rankings affect applicants' chances of obtaining the fellowship. Our findings revealed that, in a context of high social inequalities and a stratified education system, using international rankings as an awarding criterion reinforced the position of privilege of individuals who accrued educational advantages in high school, as well as the disadvantages of those less fortunate who faced fewer prior educational opportunities.

**Keywords:** international university rankings; graduate education abroad; path analysis

## 1. Introduction

In the last few decades, countries with emerging economies from all over the world have been seeking to increase their participation in the so-called knowledge economy. In this regard, the main challenges facing these countries are the small number of doctorate holders and the few national institutions that provide doctoral education (Nerad and Evans 2014). Thus, emerging countries have invested an important amount of resources into human capital development policies to expand the number of highly-qualified individuals who can boost their countries' research, innovation, and knowledge creation (Nerad 2010). To achieve this goal, a popular strategy among developing countries, has been the implementation of government-sponsored international fellowship programs for graduate studies (Perna et al. 2014). Most of these initiatives provide government funding through a competitive process to pursue graduate studies (master's or doctorate degrees) at a university in a foreign country. These policies aim for degree completion, usually requiring that recipients return to their home countries after graduation (Nerad 2010; Perna et al. 2014).

In this context, in which more governments are increasingly investing significant amounts of public monies to fund these type of fellowships, international university rankings (hereafter referred

to simply as "rankings") have become key policy players. By offering a simple framework to compare institutions based on a short list of performance indicators, rankings have become the preferred tool to guide the design and implementation of fellowship programs and other international education policies (Hazelkorn 2014) despite wide criticism from researchers and scholars.

Indeed, rankings have been criticized in the literature for their disproportionate emphasis on research productivity and prestige to rank universities (e.g., Hazelkorn 2014; Marginson and Van der Wende 2007; Teichler 2011). Critics also point out that such a narrow assessment of universities merely reflects their long-standing relative reputation within the global higher education landscape (Marginson 2014). In turn, human and financial resources tend to gravitate toward institutions that already are in a position of advantage within the rankings, therefore intensifying the existing stratification of higher education internationally (Hazelkorn 2011; Marginson 2014; Salmi 2016).

Many studies have documented the effects of rankings on the stratification among institutions in the global scheme (e.g., Bloch and Mitterle 2017; Vaira 2009), but little is known about the potential social stratification impact of rankings within emerging nations, which typically display relatively higher degrees of social and income inequality, echoed by highly-stratified education systems (Andere 2004). A few studies that have examined the allocation of fellowships among different socioeconomic groups (Andere 2004; Mathews 2007; Perna et al. 2015) found that these are disproportionately awarded to individuals of high socioeconomic status. However, none of them analyzed the role of rankings in the unequal distribution of fellowships.

Given the increasing worldwide trend of investing public resources to fund fellowship programs and the critical role of rankings in shaping these policies, it is important to examine whether rankings act as a stratification device within nations that are implementing these programs. Therefore, the purpose of this study was to investigate how the expanding number of fellowships is distributed among applicants of different social backgrounds and whether using international rankings as a granting criterion may be disproportionately favoring applicants from privileged social groups.

To do so, we focus on the program "Becas-Chile" implemented by the Chilean government in 2008. Given its massive scale and significant investment for a relatively small developing country (a population of around 18 million), this program is an iconic example of government-sponsored fellowships for graduate studies abroad (Organisation for Economic Co-operation and Development, OECD and The World Bank 2010). Since the program was launched, it has funded approximately 4600 master's and 3400 doctorate fellows (National Commission for Scientific and Technological Research of Chile, CONICYT 2018a). The fellowship covers tuition, as well as living expenses and health insurance for the awardees and their dependents, if applicable. One of the main requirements to apply for the Becas-Chile program is to be already accepted at a top-ranked university, per the Academic Ranking of World Universities (ARWU) or the Times Higher Education (THE) university rankings.

The Chilean case is also of interest as this country displays one of the highest degrees of income inequalities among emerging nations (OECD 2018b), which is mirrored by a highly-stratified system of education (Mizala and Torche 2012). Given that the Becas-Chile fellowship constitutes one of the largest subsidies that has been ever granted by the state of Chile to its citizens (Salas Riveros and Medrano 2017), it is of significance to examine the potential implications of the implementation of this public policy on the existing educational inequalities within this country.

Therefore, we set out to investigate whether existing inequalities of educational opportunities at prior levels of education influence the allocation of the Becas-Chile fellowship. We also aim to examine the potential social stratification effects of using rankings as a selection criterion to award the Becas-Chile fellowships. Consistent with these objectives, our study addresses the following research questions:

1.  To what extent do the prior education and demographic characteristics of applicants determine their chances of being awarded the fellowship?
2.  To what extent does the use of ranking as a selection criterion contribute to the exacerbation of existing inequalities of opportunities at prior levels of education?

## 2. Policy Context

### 2.1. Educational Inequalities in Chile

Chile has the highest income per-capita (USD$22,000 corrected by purchasing power parity) and one of the highest percentages of students enrolled in higher education relative to the total college-age population (90%) in the Latin American region (OECD 2018a; The World Bank 2018a.). Nevertheless, Chile ranks fourth in the list of countries with the highest levels of income inequality in the same region (The World Bank 2018b) and first within the OECD (OECD 2018b). In Chile, the richest 10% of the population earns on average 25-times more than the poorest 10%, while the average across OECD countries is about nine-times (OECD 2018b).

This high degree of income inequality is mirrored by disparities in education. Chile has highly stratified primary and secondary education systems, in which the distribution of students across school types is determined by socioeconomic status. In Chile, there are three types of schools: private schools that are privately owned and charge expensive tuition and fees, subsidized schools that are privately administered and publicly funded, and public schools that are run by the state and publicly funded (Ministry of Education of Chile, MINEDUC 2013). According to Mizala and Torche (2012), students in private schools come from the two wealthiest income deciles; most students in subsidized schools are distributed across the middle-income deciles; while more than two thirds of students in public schools come from the bottom half of the income distribution.

Socioeconomic status also determines student academic achievement. Chile exhibits one of the strongest degrees of correlation between socioeconomic status and achievement in Latin America (OECD 2014). This is evidenced by international achievement assessments, in which Chilean students' performance is mostly explained by the type of school attended (OECD 2014 2017a). Moreover, the opportunity to learn a second language is available almost exclusively for students attending private schools, giving these students the advantage of becoming proficient in English and other foreign languages as compared with their counterparts in public and subsidized schools (MINEDUC 2015). As for access to higher education, the type of high school attended is a critical predictor of performance on the national college admissions tests. As such, students from private schools are more likely than their peers from public and subsidized schools to access higher education and more likely to be admitted at highly selective institutions (Canales 2016).

Accreditation of higher education also plays a role in the stratification of higher education in Chile. Accreditation of universities is carried out by the National Accreditation Commission (CNA), a state agency that establishes quality assurance standards and assesses whether universities meet accreditation criteria. The accreditation is granted to institutions for a specific period, with a minimum of two and a maximum of seven years. Being accredited is a mandatory requirement for universities to receive public state funding. In this framework, the number of years of accreditation granted signals the academic quality of universities. The longer the period, the higher the quality. Currently, 43 out of the 61 existing universities in the country are accredited, and only three of them obtained the maximum period of accreditation (CNA 2018). Only 10% and 12% of students from public and subsidized high schools, respectively, are accepted to one of these three universities (MINEDUC 2018).

As for region of residence, Chile is a state divided into 16 regions, which are the country's main territorial administrative divisions. The Santiago metropolitan area is usually referred to as the "metropolitan region", while the other 15 territorial divisions are simply referred to as "regions". The metropolitan region has the largest concentration of resources and population in the country: 55% of the country's gross domestic product and almost half of the country's population (OECD 2017b), as well as the largest number of educational institutions at the primary, secondary, and tertiary levels. Within the university sector, 38 of the 61 Chilean universities have a campus in the metropolitan region, including two out of the three universities with the highest academic quality (MINEDUC 2018). As such, the Santiago metropolitan area offers the best academic opportunities.

## 2.2. The Becas-Chile Program

The Becas-Chile fellowship program was launched in 2008 to foster Chile's competitiveness in the knowledge economy by improving its scientific, technological, and innovation capacity (CONICYT 2008, 2014; Eyzaguirre et al. 2005). Given that the number of doctorate holders was far below international standards (7.08 per million inhabitants) and the limited capacity of national universities to improve these figures rapidly (National Council of Innovation for Development, CNIC 2006), Chile opted for implementing an international fellowship program as a strategy to advance the country's stock of human capital.

The implementation of Becas-Chile significantly increased the number of fellowships offered per year and introduced the ranking of the foreign university chosen by applicants (THE and ARWU) as one of the main selection criteria of the fellowship. The rationale behind this decision was to ensure that the foreign universities chosen by fellows were of "consolidated academic quality" (CNIC 2006, p. 98). Furthermore, rankings offered a practical way to assess large pools of applicants in a timely manner.

In addition, applicants were required to have completed an undergraduate degree with a grade point average (GPA) above 5.0 (on a scale from 1.0–7.0) or to have graduated within the top 30% of their class. Applicants also needed to present their curriculum vitae, statement of purpose, and two recommendation letters. The ranking of the foreign university was assigned the highest weight (40%) in the application score, followed by professional experience for applicants pursuing master's degree (30%), and research experience for those pursuing doctorate degree (12.5%), among other criteria (see Appendix A).

Initially, from 2008–2011, it was possible to apply to Becas-Chile without proof of acceptance to the foreign university stated in the application. For those in this situation, the award of a fellowship was conditional upon the presentation of an acceptance letter. However, it was not uncommon that awardees presented afterwards a letter of acceptance from a different university than the one stated originally in their application, which implied frequently revising the awarding decisions. Given the large number of awardees in this situation, this became a significant administrative burden for the program (Chiappa and Muñoz-García 2015). Therefore, an acceptance letter from a university listed among the top 150 in the ARWU or THE rankings became a mandatory prerequisite to apply for the fellowship after 2011. This additional eligibility condition produced a dramatic decrease in the number of applications as compared with previous years.

Recipients of Becas-Chile, regardless of the university and country of destination, receive funding for tuition and fees, as well as for travelling costs, living expenses, and health insurance for them and their dependents, if applicable. Moreover, the fellowship program takes into consideration that the living expenses are higher in certain cities and countries. In those cases, a higher stipend is provided to cover the more expensive costs of living. In return, recipients are required to come back to Chile and reside in the country for at least twice the number of years they were funded, although this period could be shortened under certain conditions. The important amount of state funding allocated to Becas-Chile has positioned Chile as one of the countries that has invested most in human capital development policies in Latin America (OECD and The World Bank 2010).

## 3. Literature Review

### 3.1. International University Rankings

The internationalization of higher education has created the perfect context for rankings to rise as one of the most influential tools to inform decision and policy making in higher education (Hazelkorn 2014). International students use rankings to guide their choice of university (Altbach 2006; Hazelkorn 2014), universities focus on maximizing their positioning within rankings (Hazelkorn et al. 2014; Teichler 2011), while governments use rankings as guidelines to prioritize their funding of higher education policies (e.g., Marginson 2009; Salmi 2016).

The most renowned international university rankings—ARWU, Quacquarelli Symonds (QS) World University Rankings, and THE—assess institutions mainly based on the volume and impact

of articles published by their faculty in selected journals, universities' international reputation based on surveys of opinion, and the size and characteristics of the faculty and student bodies (Pusser and Marginson 2013; Shin 2011). As such, rankings have been widely criticized in the literature for the narrowness of criteria used to compare institutions, as well as the one-size-fits-all approach that imposes a hegemonic idea of what a world-class university should be (Marginson and Van der Wende 2007; Teichler 2011). Scholars have also highlighted that rankings tend to favor a model of a research-intensive university from wealthy, developed, and mostly English-speaking countries disproportionately (see Appendix B) (Johnes 2016; Marginson and Van der Wende 2007; Ordorika and Lloyd 2014).

Despite these criticisms, international university rankings have become an important element in the design and implementation of public policies in higher education around the world (Hazelkorn 2009, 2018). A growing body of literature is focused on the extent to which these rankings have transformed and influenced higher education practices and policies (e.g., Hazelkorn 2008, 2009, 2018; Marginson and Van der Wende 2007). By incentivizing universities to privilege research over teaching and prestige over quality, rankings push universities to deviate from the core missions of higher education (Teichler 2011).

Additionally, as inherent stratification or sorting devices, rankings have intensified the degree of differentiation among institutions and countries at a global scale. The competitive position provided by rankings allows high-ranked institutions to attract and concentrate human and financial resources that help to maintain or enhance their positioning in the hierarchy established by rankings (Hazelkorn 2008, 2011, 2018; Pusser and Marginson 2013).

### 3.2. Access to Graduate Education

Studies on access to graduate education have mainly focused on the effects of social background and characteristics of prior institutions attended (Ethington and Smart 1986; Mare 1980; Mullen et al. 2003; Perna 2004; Zarifa 2012). In the United States, early studies found little influence of parents' education or socioeconomic status on the chances of attending a graduate program (Ethington and Smart 1986; Mare 1980). This evidence suggests that most of the selection effects take place when students first access higher education, so if there is indeed an effect of social background, this is mediated by the type of undergraduate institution attended. More recently, Mullen et al. (2003) found that parental education influenced chances of pursuing graduate professional and doctorate degrees and a modest, but still significant, effect on master's degree enrolment. In Canada, Zarifa (2012) found that students whose parents had completed an undergraduate or a graduate degree were more likely to be enrolled in graduate programs as compared to their peers whose parents did not have university degrees. In a study on the transition from undergraduate to graduate studies in England, Wakeling and Hampden-Thompson (2013) found that students from lower socioeconomic backgrounds, as measured by high school type and parental education, are slightly underrepresented among those progressing to graduate education. Although this literature is informative with respect to the influence of socioeconomic status on access to graduate education, it focuses on the chances of pursuing graduate degrees within the same country of origin, which is not exactly the case in our study. Moreover, this body of literature has paid little attention to the role of socioeconomic status in pursuing graduate studies at universities of a particular prestige, as measured by rankings.

On the other hand, the few studies that have looked specifically at government-sponsored international fellowship programs for graduate studies have focused on the factors that affect participation of applicants of different sociodemographic characteristics (Andere 2004; Perna et al. 2015), the individual motivation applicants have to participate in these programs (Ahmad et al. 2016), the academic performance in their graduate studies (Mathews 2007), and the potential individual and national benefits of these programs (Grieco 2015). Some of these scholars have noticed that international fellowships seem to favor individuals who come from privileged backgrounds, but their methodological approach has been either qualitative or descriptive (e.g., Andere 2004; Perna et al. 2015). To our best knowledge, there is no study that has quantitatively measured the role of

sociodemographic characteristics in the allocation of international fellowships for graduate studies abroad.

As for the specific case of graduate education in Chile, we were not able to find any studies about how family socioeconomic status may influence access to graduate programs, not even in national universities. However, a recent evaluation report (Program for the Improvement of Quality and Equity in Tertiary Education, MECESUP 2014), based on a representative sample of 93 national doctorate programs, found that more than 50% of enrolled students had at least one parent who completed a college degree. This evidence suggests that in Chile, socioeconomic factors may play a role in access to graduate education.

## 4. Conceptual Framework

This study relies on social reproduction theories that assume that the position of individuals within the social hierarchy is transmitted from one generation to the next. From this perspective, one of the main mechanisms contributing to social reproduction is through socially-stratified educational institutions, in which educational opportunities are determined by membership to a particular social group. The social advantages or disadvantages associated with the status of origin begin to accrue early in childhood and continue to grow throughout the schooling years (Dannefer 2003). From this viewpoint, rather than producing social change, schools and universities contribute to the maintenance of the status quo (Bourdieu and Passeron 1977).

Social stratification theories aim to explain the dynamics through which members of society are sorted or arranged into hierarchies according to their wealth, status, and power (Blau 1975). These theories pose that economic, political, and technological changes continually threaten to destabilize the existing social order, which in turn trigger stabilizing mechanisms that react against social change (Lipset 1975). Accordingly, we assume that the expansion of educational opportunities provided by an increasing number of fellowships available acts as a destabilizing mechanism that defies the existing social order, as they potentially allow new social groups to access resources and educational opportunities that were previously reserved for an exclusive elite group of students. To counteract this trend, by making the relative position of the university to which applicants gained admissions a condition to award the fellowship, rankings serve as a socio-technical device that stabilizes the system back to the prior state of social equilibrium (Bloch and Mitterle 2017; Lipset 1975).

Stratification theories rest on the assumption that the inequalities implied by the social hierarchy must be withstood by all members of society, especially those in the lower segments, in order to maintain a stabilized social order. To do so, stratification must count on a legitimizing ideology that serves as a satisfactory and convincing justification of existing inequalities (Asimakopoulos 2008). From a functionalist viewpoint, this justification typically states that individuals should be rewarded by society according to their acquired levels of knowledge and skills (Blau 1975). The functionalist perspective has been criticized because it takes for granted that all individuals have equal opportunities to acquire those skills and knowledge, which is not the case when social stratification is closely aligned with the vertical differentiation of educational institutions (Marginson 2016).

In line with the legitimizing ideology argument, we assume that rankings constitute the legitimizing criterion needed to justify the unequal distribution of fellowships among applicants according to their prior education. Even in the presence of expanding opportunities to education, when these are allocated through a competitive process, those who started their education at the lower segments of the schooling system are put at a disadvantage in such a competition (Marginson 2016). Although unequal starting places in any competition are undeniably unfair, by utilizing a sorting mechanism that does not consider the initial relative position of competitors, rankings give a misleading appearance of fairness. Thus, in this illusive scheme, being accepted at a high-ranked university can be attributed to a higher academic potential, thus justifying the use of rankings as a selection criterion to award the fellowships.

In a context in which social stratification is closely associated with the vertical segmentation of educational institutions, as it is in the case of Chile, individuals from more privileged social backgrounds are more likely to be accepted at foreign high-ranked universities than those from lower

social and educational segments of society (Waters 2012). It follows then that a wider range of educational opportunities would not necessarily translate into upward mobility of students across strata. In other words, "social access widens but the average probability of reaching the elite level is reduced" (Marginson 2016, p. 82).

In summary, considering both social reproduction and stratification theories, we hypothesize that the increment of educational opportunities offered by a growing number of fellowships, mediated by rankings, will likely reinforce the existing social stratification within the country, in which prior levels of education have acted as social reproduction mechanisms. As such, we believe that rankings not only play a key role in differentiating institutions of higher education at a global level, but also in structuring opportunities at the national level by legitimizing the unequal distribution of fellowships among applicants of different social backgrounds.

## 5. Methods

### 5.1. Data Sources

We were granted access to the application dataset of the Becas-Chile fellowship program from CONICYT, which is the government agency responsible of the administration of this program. We also drew from publicly-available data on university rankings, including ARWU, THE, and QS from their corresponding websites (ARWU 2017; QS 2018; THE 2018), as well as data on the accreditation of Chilean universities from the National Accreditation Commission (CNA) from its website (CNA Chile 2018).

### 5.2. Sample

The dataset contained applications for different fellowship programs. For this study, we only considered applicants for the fellowship program for graduate studies abroad. Furthermore, we only included applicants for the period of 2011–2015 because the requirements to apply to the fellowship and the evaluation criteria to assess applicants were the same throughout this period, as explained earlier in Section 2.2. Finally, we only included in the sample individuals whose applications met the requirements and were considered in the evaluation process for the fellowship. After excluding cases from the dataset that did not meet these criteria, the analytical sample was composed of 8130 applicants.

### 5.3. Variables

- Fellowship awarded ($Y_1$): This variable indicates whether the applicant was awarded a fellowship or not. It was entered into the model as a binary dummy-coded variable (yes = 1; no = 0).
- Fellowship application score ($Y_2$): This variable is the total score resulting from the evaluation process of applications for the fellowship program. It was included in the model as a continuous standardized variable (mean = 0, SD = 1).
- Ranking of graduate university ($Y_3$): This is a composite variable that was obtained through confirmatory factor analysis using three global university rankings: ARWU, THE, and QS. The resulting variable combines the information provided by these three global university rankings, and it was incorporated in the model as a continuous standardized variable (mean = 0, SD = 1).
- Quality of undergraduate university ($Y_4$): This is an ordinal discrete variable that represents the number of years of accreditation granted to the university from which applicants obtained their undergraduate degree. This variable was included in the model as a continuous standardized variable (mean = 0, SD = 1).
- High school type ($X_1$): This variable indicates whether applicants studied in a private, subsidized, or public high school. It was included as a dummy-coded variable of three categories (yes = 1, no = 0) with private high school as the reference group.
- Gender ($X_2$): Nominal variable included in the model as a dummy-coded variable (female = 1, male = 0), with males as the reference group.

- Age ($X_3$): This variable indicates applicants' age when they applied to the fellowship, and it was incorporated into the model as a continuous standardized variable (mean = 0, SD = 1).
- Region of residence ($X_4$): The region was included as a binary dummy-coded variable indicating whether applicants lived in the metropolitan area or in regions (regions = 1; metropolitan region = 0), with residents of the metropolitan area as the reference group.
- Discipline of study ($X_5$): This is a nominal variable indicating six disciplines, based on the categories established by the OECD: (1) agriculture; (2) medicine and health; (3) natural sciences; (4) social sciences; (5) humanities; and (6) engineering and technology. Each category of this variable was entered into the model as a binary dummy-coded variable (yes = 1, no = 0), with social sciences as the reference group.
- Intended degree ($X_6$): This is a nominal variable indicating whether the applicants were admitted to a master's or a doctorate degree program. It was incorporated in the model as a binary dummy-coded variable (doctorate degree = 1, master's degree = 0), with master's degree as the reference group.

A summary of the descriptive statistics of the applicants' characteristics is provided in Table 1. This descriptive information was obtained separately for applicants who did and did not obtain the fellowship.

**Table 1.** Summary of the descriptive statistics of the sample.

| Nominal Variables | Fellowship Awarded | | | | | |
| | No | | Yes | | Total | |
| | N | % | N | % | N | % |
|---|---|---|---|---|---|---|
| *Gender* | | | | | | |
| Male | 2514 | 59% | 1770 | 41% | 4284 | 100 |
| Female | 2376 | 62% | 1470 | 38% | 3846 | 100 |
| *Region of Residence* | | | | | | |
| Metropolitan region | 2811 | 59% | 1993 | 41% | 4804 | 100 |
| Regions | 1913 | 62% | 1181 | 38% | 3094 | 100 |
| *High School Type* | | | | | | |
| Public | 881 | 63% | 509 | 37% | 1390 | 100 |
| Subsidized | 1269 | 65% | 673 | 35% | 1942 | 100 |
| Private | 1725 | 54% | 1474 | 46% | 3199 | 100 |
| *Intended Degree* | | | | | | |
| Master's | 3958 | 68% | 1861 | 32% | 5819 | 100 |
| Ph.D. | 932 | 40% | 1379 | 60% | 2311 | 100 |
| *Discipline of study* | | | | | | |
| Agricultural sciences | 175 | 58% | 129 | 42% | 304 | 100 |
| Medical & health | 338 | 62% | 210 | 38% | 548 | 100 |
| Natural sciences | 479 | 51% | 463 | 49% | 942 | 100 |
| Social sciences | 2389 | 61% | 1538 | 39% | 3927 | 100 |
| Humanities | 969 | 63% | 573 | 37% | 1542 | 100 |
| Engineering and Technology | 540 | 62% | 327 | 38% | 867 | 100 |
| Total | 4890 | 60% | 3240 | 40% | 8130 | 100 |
| **Ordinal and Continuous Variables** | **Mean (SD)** | **Range** | **Mean (SD)** | **Range** | **Mean (SD)** | **Range** |
| Age | 30.5 (4.5) | [22.0, 61.0] | 30.1 (4.5) | [21.0, 62.0] | 30.3 (4.3) | [21.0, 62.0] |
| Quality of undergraduate university (accreditation period) | 5.6 (1.5) | [0.0, 7.0] | 6.2 (1.2) | [0.0, 7.0] | 5.8 (1.5) | [0.0, 7.0] |
| Fellowship application score | 3.7 (0.5) | [1.1, 5.0] | 4.3 (0.3) | [3.5, 5.1] | 4.0 (0.5) | [1.1, 5.1] |
| ARWU rank score | 25.1 (13.0) | [6.5, 98.0] | 32.5 (16.7) | [6.5, 98.0] | 28.2 (15.1) | [6.5, 100] |
| QS rank score | 59.8 (23.6) | [1.1, 99.8] | 69.9 (21.5) | [1.4, 99.8] | 64.0 (23.3) | [1.1, 99.8] |
| THE rank score | 59.7 (17.1) | [12.2, 94.3] | 68.9 (15.7) | [14.2, 94.3] | 63.5 (17.2) | [12.2, 94.3] |

### 5.4. Analytical Approach

A path analysis was conducted to examine the hypothesized causal relationships among variables in the model. The variables and relationships of a path model are usually specified in the form of a path diagram, in which squares or rectangles represent variables and single arrowhead lines correspond to relationships among variables (Kline 2005). Path models present several advantages over multiple regression. Path analysis allows variables to have a dual role as both dependent and independent variables, thus providing estimates of direct and indirect effects of variables that are causally related with one another. Furthermore, unlike multiple regression, this approach has the advantage of estimating all the relationships among variables simultaneously.

The variables included in the model and the hypothesized paths or relationships among them are depicted in the path diagram of Figure 1. There are 10 variables: $X_1$, high school type; $X_2$, gender; $X_3$, age; $X_4$, area of residence; $X_5$, discipline of study; $X_6$, intended degree; $Y_1$, fellowship awarded; $Y_2$, fellowship application score; $Y_3$, ranking of undergraduate university; and $Y_4$, quality of undergraduate degree. $Y_1$ is the dependent variable assumed to be affected or caused by the independent variable $X_1$.

The variables $Y_2$, $Y_3$, and $Y_4$, located in between $X_1$ and $Y_1$, are considered mediator variables of the relationship between $X_1$ and $Y_1$. Because the mediator variables are caused by precedent variables in the causal structure (e.g., $Y_3$ is caused by $Y_4$) and, simultaneously, they are the cause of the following variable (e.g., $Y_3$ is the cause of $Y_2$), mediator variables are considered both dependent and independent variables (Kline 2005). The variables $X_2$ to $X_6$, correspond to covariate variables, assumed to be related to the dependent and mediator variables $Y_j$, but minimally associated with $X_1$ (Mackinnon 2008). The $Y_j$ variables, which are affected or caused by other variables in the model (at least one arrow is leading into them) are denominated endogenous variables, while $X_i$ variables that are not caused by other variables in the model (no arrows pointing at them) are denominated exogenous variables (Schumacker and Lomax 2004).

In Figure 1, the corresponding effects of endogenous and exogenous variables are represented by the Greek letters β (beta) and γ (gamma), respectively. These path coefficients represent the direct effects of one variable on another and they are interpreted just as multiple regression coefficients. The direct effects on each endogenous variable are estimated using multiple regression, specifying one regression equation for each endogenous variable. Each endogenous variable has an error term ($\varepsilon_j$) that represents the variance that is not explained by the variable in the regression equation. The direct effects corresponding to the path diagram in Figure 1 are the following:

$$Y_1 = \beta_{12} Y_2 + \beta_{13} Y_3 + \beta_{14} Y_4 + \gamma_{11} X_1 + \gamma_{12} X_2, + \gamma_{13} X_3 + \gamma_{14} X_4 + \gamma_{15} X_5 + \gamma_{16} X_6 + \varepsilon_1, \tag{1}$$

$$Y_2 = \beta_{23} Y_3 + \beta_{24} Y_4 + \gamma_{21} X_1 + \gamma_{22} X_2, + \gamma_{23} X_3 + \gamma_{24} X_4 + \gamma_{25} X_5 + \gamma_{26} X_6 + \varepsilon_2, \tag{2}$$

$$Y_3 = \beta_{34} Y_4 + \gamma_{31} X_1 + \gamma_{32} X_2, + \gamma_{33} X_3 + \gamma_{34} X_4 + \gamma_{35} X_5 + \gamma_{36} X_6 + \varepsilon_3, \tag{3}$$

$$Y_4 = \gamma_{41} X_1 + \gamma_{42} X_2, + \gamma_{43} X_3 + \gamma_{44} X_4 + \gamma_{45} X_5 + \gamma_{46} X_6 + \varepsilon_4, \tag{4}$$
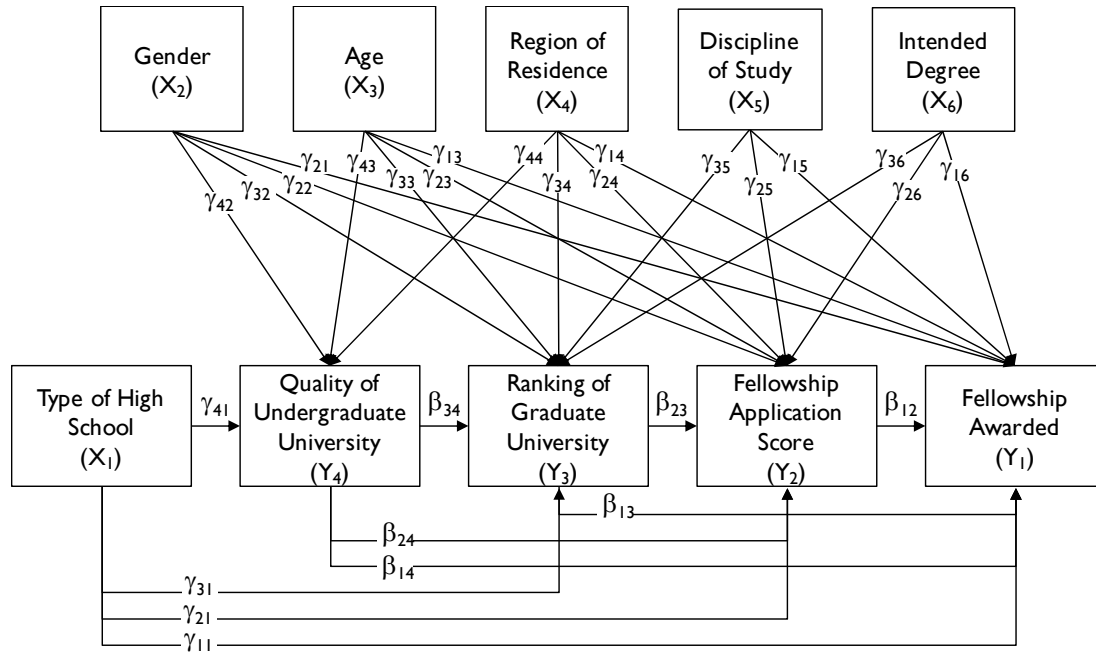
**Figure 1.** Path diagram of hypothesized relationships among variables in the model.

Additionally, in a path model, there are indirect effects that involve one or more mediator variables that transfer some of the causal effects of preceding variables onto subsequent variables (Kline 2005). There are several methods used to estimate indirect effects; however, these are usually obtained as the product of the coefficients involved in the specific indirect or mediated effect (Maruyama 1998). In this model, the total indirect effect $X_1$ on $Y_1$ is composed of seven potential indirect effects, which are specified by the following equations:

$$X_1 \rightarrow Y_4 \rightarrow Y_3 \rightarrow Y_2 \rightarrow Y_1 = \gamma_{41} \times \beta_{34} \times \beta_{23} \times \beta_{12}, \tag{5}$$

$$X_1 \rightarrow Y_3 \rightarrow Y_2 \rightarrow Y_1 = \gamma_{31} \times \beta_{23} \times \beta_{12}, \tag{6}$$

$$X_1 \rightarrow Y_4 \rightarrow Y_2 \rightarrow Y_1 = \gamma_{41} \times \beta_{24} \times \beta_{12}, \tag{7}$$

$$X_1 \rightarrow Y_4 \rightarrow Y_3 \rightarrow Y_1 = \gamma_{41} \times \beta_{34} \times \beta_{13}, \tag{8}$$

$$X_1 \rightarrow Y_2 \rightarrow Y_1 = \gamma_{21} \times \beta_{12}, \tag{9}$$

$$X_1 \rightarrow Y_3 \rightarrow Y_1 = \gamma_{31} \times \beta_{13}, \tag{10}$$

$$X_1 \rightarrow Y_4 \rightarrow Y_1 = \gamma_{41} \times \beta_{14}, \tag{11}$$

The mediator variables $Y_3$ and $Y_4$ also have indirect effects on $Y_1$. These effects are also obtained as the product of the coefficients involved in the corresponding indirect effect, in the same manner as shown for the indirect effects of $X_1$ on $Y_1$.

### 5.5. Model Specification

Mplus 8.1 was used to conduct the analyses. Because there was a combination of continuous and categorical dependent variables in the model and some of the variables had missing data, a Weighted Least Squares Estimation with Missing Data (WLSMV) estimator was used (Muthén and Muthén 1998–2017). We also used bootstrap resampling (10,000 samples) to estimate mediating effects and their confidence intervals. The final model was estimated using all available cases in the dataset (8130).

To specify the model, we followed the steps recommended by Baron and Kenny (1986) to establish mediation, which involved verifying that: (1) the independent variable is a significant predictor of the dependent variable in a single regression equation; (2) the independent variable is a significant predictor of each of the mediator variables; and (3) each of the mediator variables is a significant predictor of the dependent variable controlling for the effect of the independent variable. Then, we built the full model as specified in Figure 1. Finally, for the sake of parsimony, we did not include in the final model the effects that were not statistically significant. The syntax to estimate the final model in Mplus is included in Appendix C.

To judge the extent to which the model fit the data appropriately, we obtained the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). We relied on Hu and Bentler's (1999) cut-off values to assess the fit of the model, with values of CFI ≥ 0.96, RMSEA ≤ 0.06, and SRMR ≤ 0.09, indicating that data fit the model appropriately.

## 5.6. Missing Data

There were only three variables in the dataset with more than 1% of missing data: high school type, the composite variable of ranking of the graduate university, and area of residence. The amount and percentage of missingness for each of these variables are displayed in Table 2. The variable with the highest amount of missing data is high school type (20% of missing data), because high school type was not registered in applications for the master's fellowship in years 2013 and 2014. As such, the missingness on high school type is given by another covariate included in the model (intended degree). Therefore, missing data on high school type is Missing At Random with respect to X (MARX), in which only covariate variables influence the missing data patterns (Asparouhov and Muthen 2010).

**Table 2.** Variables with missing data.

| Variable | N | Percent |
|---|---|---|
| High school type | 1590 | 20% |
| Ranking of graduate university (composite) | 512 | 6% |
| Area of residence | 232 | 3% |

To avoid potential bias in the estimation due to missing data, WLSMV was used. This estimator yields consistent estimates when dealing with missing data under the assumption of MARX (Asparouhov and Muthen 2010). Furthermore, to verify that missingness in high school type did not produced biased estimators, we ran two alternative models, one removing cases with missing data and another one using all available cases. Both models produced almost identical parameter estimates with similar confidence intervals. This indicated that the results provided by our final model were robust in the presence of missing data.

## 5.7. Limitations

The dataset does not include specific information about applicants' academic ability, although this information is somewhat contained in the fellowship application score, which considered the undergraduate GPA and whether the students graduated among the top 30% of their class as criteria to evaluate applications (see Appendix A). However, the omission of this information from the causal structure may have resulted in the under- or over-estimation of true causal effects, depending on the extent to which the omitted variables correlate with variables included in the model.

Furthermore, the data did not have information about the entire pool of foreign universities to which individuals may have applied; neither did it have information about the reasons why applicants selected a particular university. It was assumed that applicants who were admitted to more than one university chose the one with the highest ranking.

## 6. Results

The final model fit the data properly, based on the estimated fit indices (RMSEA = 0.020, CFI = 0.983, SRMR = 0.038). The final model explained 67% of the variance in the dependent variable $Y_1$. The direct effects estimated for the final model are shown in Table 3.

**Table 3.** Estimated direct effects on endogenous variables of the final model.

|  | Estimate * | Standard Error |
|---|---|---|
| *Effects on Awarded Fellowship ($Y_1$)* | | |
| Fellowship application score | 0.800 | 0.010 |
| Intended degree (doctorate) | 0.645 | 0.026 |
| Intercept | −0.449 | 0.018 |
| *Effects on Fellowship Application Score ($Y_2$)* | | |
| Ranking of graduate university | 0.505 | 0.011 |
| Quality of undergraduate university | 0.179 | 0.011 |
| Discipline (natural sciences) | 0.134 | 0.036 |
| Intended degree (doctorate) | 0.280 | 0.022 |
| Intercept | −0.117 | 0.015 |
| *Effects on Ranking of Graduate University ($Y_3$)* | | |
| Type of high school (public) | −0.433 | 0.039 |
| Type of high school (subsidized) | −0.404 | 0.036 |
| Quality of undergraduate university | 0.189 | 0.011 |
| Area of residence (regions) | −0.226 | 0.034 |
| Gender (female) | −0.156 | 0.025 |
| Intended degree (doctorate) | −0.419 | 0.026 |
| Intercept | 0.474 | 0.023 |
| *Effects on Quality of Undergraduate University ($Y_4$)* | | |
| Type of high school (public) | −0.341 | 0.032 |
| Type of high school (subsidized) | −0.362 | 0.027 |
| Area of residence (regions) | −0.245 | 0.024 |
| Intercept | 0.264 | 0.020 |
| *Variance Explained ($R^2$)* | | |
| Awarded fellowship ($Y_1$) | 0.668 | 0.012 |
| Fellowship application score ($Y_2$) | 0.328 | 0.010 |
| Ranking of graduate university ($Y_3$) | 0.163 | 0.009 |
| Quality of undergraduate university ($Y_4$) | 0.055 | 0.005 |

* All estimates are statistically significant (*p*-value < 0.001).

### 6.1. Direct Effects

The effects reported in Table 3 correspond to the direct effects on each endogenous variable. In the case of the effects of categorical variables, the specific category that had a significant effect on the corresponding endogenous variable is indicated in parenthesis. For example, the direct effect of intended degree on $Y_1$ corresponds to the effect of a doctorate degree.

The effects on the variable awarded fellowship ($Y_1$) correspond to probit regression coefficients, i.e., z-score values. As for intended degree, applicants pursuing a doctorate degree had a z-score value 0.645 higher than applicants pursuing master's degrees. In terms of probabilities, this means that applicants pursuing doctorate degrees had 59% probabilities of obtaining the fellowship, in contrast with only 34% probability for those pursuing master's degrees. This difference represents an effect of a 25 percentage points change in the probabilities associated with intended degree.

Regarding the effect of the fellowship application score ($Y_2$) on awarded fellowship ($Y_1$), the predicted probabilities associated with changes in application scores in SD are depicted in Figure 2. The s-shaped curve of the distribution of probabilities indicates that change in application scores

cause a non-linear response on the probabilities of being awarded the fellowship (Pampel 200). This means that changes in the application scores starting at the extremes of the horizontal axis cause a lower change in probabilities as compared with changes in the application scores starting closer to the mean. For example, an increase of 1 SD above the mean in the application score, from 0 SD to 1 SD, increased the probabilities of being awarded the fellowship from 34% to 65%, an effect of 31 percentage points. However, an equivalent increase of 1 SD, but from 1 SD to 2 SD, changed the probabilities from 65% to 88%, a lower effect of 23 percentage points.
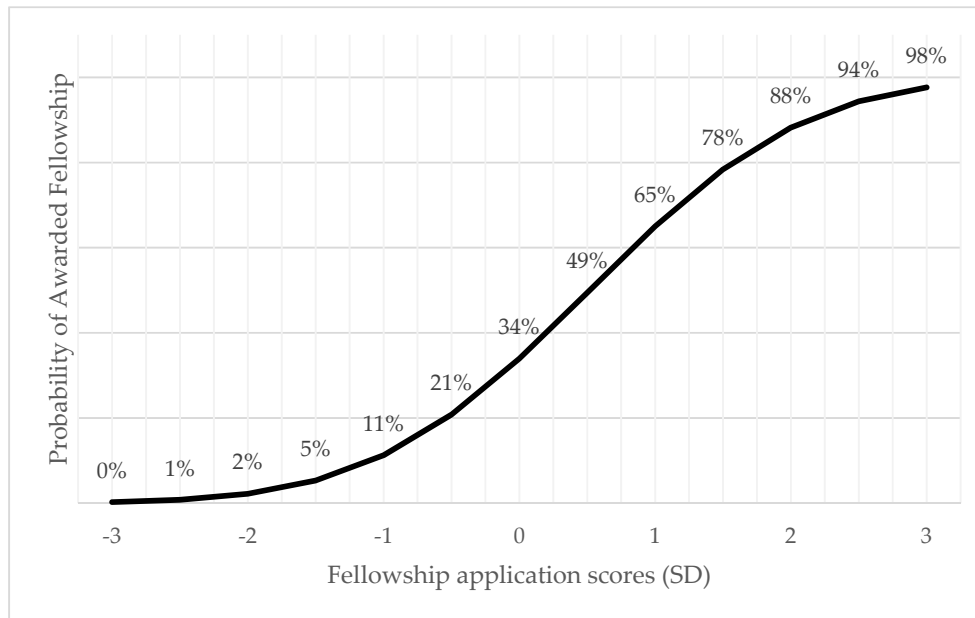


**Figure 2.** Non-linear response of predicted probabilities of awarded fellowship to changes in fellowship application scores in SD.

In turn, the fellowship application score ($Y_2$) was mostly dependent on the ranking of the graduate university ($Y_3$). A 1 SD increase in the ranking rose the application score by half of an SD. Having a higher quality undergraduate university increased the application score by 0.179 SD. Furthermore, pursuing a doctorate degree increased the application score by 0.280 SD. Applicants pursuing graduate degrees in natural sciences obtained 0.134 SD higher application scores than applicants in other disciplines.

As for the effects on ranking of the graduate university ($Y_3$), applicants who attended public and subsidized schools were accepted to graduate programs in universities of 0.433 and 0.404 SD lower ranking as compared with applicants who attended private schools, respectively. Furthermore, applicants who lived in regions were, on average, accepted to 0.419 SD lower ranked graduate universities as compared with applicants from the metropolitan region. Surprisingly, applicants pursuing doctoral studies were admitted to universities of 0.474 SD lower rank as compared with applicants pursuing master's degrees. Even more unexpected was the effect of the quality of the undergraduate university attended, which was less than a half than that of high school type. Applicants who attended 1 SD higher quality undergraduate universities were admitted to graduate programs in universities with 0.189 SD higher international ranking. On average, female applicants gained admissions to 0.156 SD lower ranked universities as compared with their male counterparts.

Lastly, the quality of the undergraduate university attended ($Y_4$) was determined by the type of high school ($X_1$) and area of residence ($X_4$). As expected, applicants from public and subsidized schools obtained their undergraduate degrees from universities of 0.341 and 0.362 SD lower quality as compared with applicants from private schools, respectively. Furthermore, those living in regions attended undergraduate universities 0.245 SD lower quality as compared with applicants from the metropolitan region.

*6.2. Indirect Effects*

Table 4 shows the estimates of the total, direct, and indirect effects of variables of interest on the dependent variable ($Y_1$), as well as on the ranking of the graduate university ($Y_3$). The total effect is the sum of direct and indirect effects. Direct effects involve only two variables that are directly related to one another, while indirect effects travel through the causal structure across different paths that involve three or more variables. For example, the total indirect effect of public and subsidized schools ($X_1$) on being awarded the fellowship ($Y_1$) traveled through three different paths: $X_1{\rightarrow}Y_3{\rightarrow}Y_2{\rightarrow}Y_1$, $X_1{\rightarrow}Y_4{\rightarrow}Y_2{\rightarrow}Y_1$, and $X_1{\rightarrow}Y_4{\rightarrow}Y_3{\rightarrow}Y_2{\rightarrow}Y_1$. The proportion of the total effect carried by each path is reported in the last column of Table 4, which allows gauging the relative importance of direct and indirect effects, as well as the contribution of each path in transferring the mediated effects from one variable to another.

As shown in Table 4, despite the absence of direct effects on the chances of obtaining the fellowship ($Y_1$), high school type ($X_1$) still affected the chances of obtaining the fellowship via the three indirect effects previously mentioned. Therefore, the total effect of $X_1$ on $Y_1$ corresponds to the sum of those three indirect effects, which added up to a total of −0.250 and −0.243 for public and subsidized schools, respectively. The largest indirect effect of $X_1$ on $Y_1$, was the one mediated by the ranking of the university ($Y_3$) and the fellowship application score ($Y_2$), which corresponds to the path $X_1{\rightarrow}Y_3{\rightarrow}Y_2{\rightarrow}Y_1$. These effects represented 70% and 67% of the total effect of public and subsidized schools on the chances of obtaining the fellowship, respectively.

Similarly, the region of residence ($X_4$) had a total negative effect of −0.145 SD on the chances of obtaining the fellowship ($Y_1$) for applicants who lived in regions. Just as for high school type, the largest effect of the area of residence on $Y_1$ was the indirect effect transmitted via the path $X_4{\rightarrow}Y_3{\rightarrow}Y_2{\rightarrow}Y_1$ that goes through the ranking of the university ($Y_3$) and the fellowship application score ($Y_2$), representing 63% of the total effect of the area of residence.

As expected, the quality of the undergraduate university ($Y_4$) had a positive total effect on the probability of being awarded the fellowship ($Y_1$), which was composed only by two indirect effects. One of these was carried by the application score ($Y_2$) via the path $Y_4{\rightarrow}Y_2{\rightarrow}Y_1$, which represented 65% of the total effect. The second indirect effect travelled through the path $Y_4{\rightarrow}Y_3{\rightarrow}Y_2{\rightarrow}Y_1$ that goes through the ranking of the graduate university ($Y_3$) and the fellowship application score ($Y_2$), which explained the remaining 35% of the total effect.

The ranking of the graduate university ($Y_3$) had a quite sizable total effect (0.404) on the probability of being awarded the fellowship ($Y_1$), which was composed by only one indirect effect represented by the path $Y_3{\rightarrow}Y_2{\rightarrow}Y_1$ that goes through the fellowship application score ($Y_2$). Such a large effect is not surprising, given the fact that the ranking of the graduate university was, by definition, the criterion with the most weight in the application evaluation.

As for the total effects of high school type ($X_1$) on the ranking of the graduate university ($Y_3$), both public and subsidized schools had negative direct and indirect effects. Because the quality of the undergraduate university ($Y_4$) is the only mediator variable between $X_1$ and $Y_3$, there is only one possible indirect effect ($X_1{\rightarrow}Y_4{\rightarrow}Y_3$). However, this indirect effect represents only 13% and 14% of the total effect of public and subsidized schools, respectively. This is, more than 85% of the effect of high school type on the ranking of the graduate university corresponded to a direct effect, while the undergraduate university transferred only a small portion of the total effect of high school type to the ranking of the graduate university.

To further understand the critical mediating role of the international ranking of the graduate university ($Y_3$) in transferring the effects of high school type ($X_1$) on awarded fellowship ($Y_1$), we estimated an alternative model that specified indirect effects in absence of the ranking of the graduate university as a mediator in the causal structure. As a result, the respective effects of public and subsidized schools went from −0.250 SD and −0.243 SD in the original model to −0.110 SD and −0.119 SD in the alternative model. Therefore, hypothetically, in absence of the mediating effect of the ranking of the graduate university, the indirect effect of the high school type would decrease by more than a half as compared with the effects of the original model reported in Table 4.

**Table 4.** Specific and total indirect effects.

| Effects | Estimate * | Standard Error | % of Total Effect |
|---|---|---|---|
| *High School Type ($X_1$), Public on $Y_1$* | | | |
| Direct Effect | - | - | - |
| Specific Indirect Effects | | | |
| $X_1 \rightarrow Y_3 \rightarrow Y_2 \rightarrow Y_1$ | −0.175 | 0.016 | 70% |
| $X_1 \rightarrow Y_4 \rightarrow Y_2 \rightarrow Y_1$ | −0.049 | 0.006 | 20% |
| $X_1 \rightarrow Y_4 \rightarrow Y_3 \rightarrow Y_2 \rightarrow Y_1$ | −0.026 | 0.003 | 10% |
| Total Effect | −0.250 | 0.019 | 100% |
| *High School Type ($X_1$), Subsidized on $Y_1$* | | | |
| Direct Effect | - | - | - |
| Specific Indirect Effects | | | |
| $X_1 \rightarrow Y_3 \rightarrow Y_2 \rightarrow Y_1$ | −0.163 | 0.015 | 67% |
| $X_1 \rightarrow Y_4 \rightarrow Y_2 \rightarrow Y_1$ | −0.052 | 0.006 | 21% |
| $X_1 \rightarrow Y_4 \rightarrow Y_3 \rightarrow Y_2 \rightarrow Y_1$ | −0.028 | 0.003 | 12% |
| Total Effect | −0.243 | 0.018 | 100% |
| *Area of Residence ($X_4$), Regions on $Y_1$* | | | |
| Direct Effect | - | - | - |
| Specific Indirect Effects | | | |
| $X_4 \rightarrow Y_3 \rightarrow Y_2 \rightarrow Y_1$ | −0.091 | 0.014 | 63% |
| $X_4 \rightarrow Y_4 \rightarrow Y_2 \rightarrow Y_1$ | −0.035 | 0.004 | 24% |
| $X_4 \rightarrow Y_4 \rightarrow Y_3 \rightarrow Y_2 \rightarrow Y_1$ | −0.019 | 0.002 | 13% |
| Total Effect | −0.145 | 0.016 | 100% |
| *Quality of Undergraduate University ($Y_4$) on $Y_1$* | | | |
| Direct Effect | - | - | - |
| Specific Indirect Effects | | | |
| $Y_4 \rightarrow Y_2 \rightarrow Y_1$ | 0.143 | 0.009 | 65% |
| $Y_4 \rightarrow Y_3 \rightarrow Y_2 \rightarrow Y_1$ | 0.076 | 0.005 | 35% |
| Total Effect | 0.219 | 0.010 | 100% |
| *Ranking of Graduate University ($Y_3$) on $Y_1$* | | | |
| Direct Effect | - | - | - |
| Specific Indirect Effects | | | |
| $Y_4 \rightarrow Y_3 \rightarrow Y_1$ | 0.404 | 0.009 | 100% |
| Total Effect | 0.404 | 0.009 | 100% |
| *High School Type ($X_1$), Public on $Y_3$* | | | |
| Direct Effect | −0.433 | 0.039 | 87% |
| Specific Indirect Effects | | | |
| $X_1 \rightarrow Y_4 \rightarrow Y_3$ | −0.064 | 0.007 | 13% |
| Total Effect | −0.497 | 0.039 | 100% |
| *High School Type ($X_1$), Subsidized on $Y_3$* | | | |
| Direct Effect | −0.404 | 0.036 | 85% |
| Specific Indirect Effects | | | |
| $X_1 \rightarrow Y_4 \rightarrow Y_3$ | −0.068 | 0.006 | 14% |
| Total Effect | −0.473 | 0.039 | 100% |

\* All effects are statistically significant ($p$-value < 0.001).

## 7. Discussion and Conclusions

Our study aimed to investigate the extent to which prior education and demographic characteristics of applicants determined their chances of being awarded a fellowship to study a graduate program abroad. In this regard, the direct effects revealed that the fellowship application score, which is one of the main factors determining the chances of getting the fellowship, was higher

for those who obtained their undergraduate degrees from high-quality universities in Chile, as well as for applicants who had been accepted to higher ranked institutions to pursue graduate studies abroad. In turn, the quality of the undergraduate university in Chile and the ranking of the foreign university attended were both mostly determined by the type of high school attended and demographic characteristics.

In other words, individuals who went to public and subsidized high schools had lower chances of attending high quality undergraduate institutions and, consequently, lower chances of being admitted to a top-ranked university abroad. Surprisingly, the type of high school attended had a larger effect on the ranking of the graduate university than on the quality of the undergraduate university attended. This means that the chances of being awarded a fellowship for graduate studies abroad is more likely to be associated with knowledge and skills that were acquired during high school than during the undergraduate studies. One factor that may partially explain the relatively larger effect of high school type may be due to the fact that access to top-ranked universities, mostly located in English speaking countries, requires applicants to demonstrate proficiency in a foreign language, which is strongly correlated with having studied in a private high school and coming from affluent families (MINEDUC 2015). These findings support Bourdieu and Passeron's theory (1977) that educational institutions serve to maintain and reproduce the structure of inequalities of the larger social context. Specifically, this study evidences that the role of secondary schools in reproducing social inequalities is paramount.

We also set out to examine the role of rankings as a criterion to assess the academic potential of applicants for the fellowship. By examining the mediating effect of the ranking of the foreign university in the causal structure, the indirect effects showed that about 70% of the total indirect effect of high school type on the chances of obtaining the fellowship was transmitted through the ranking of the university to which students had been accepted to pursue their graduate degrees. In line with Marginson's (2016) argument that international university rankings are stratification tools that widen inequalities of educational opportunities, our findings show that the international ranking of the foreign university is the variable in the model that contributes most to the reinforcement of existing educational inequalities associated with the type of high school attended and area of residence. Moreover, when the ranking of the foreign university was removed from the path model, the indirect effect of high school type on the probability of earning the fellowship decreased by more than half.

In conclusion, our findings show that the unequal structure of educational opportunities of the Chilean school system according to socioeconomic status, defined by the type of high school attended, not only determines the quality of the undergraduate university in which students completed their undergraduate studies, but also that of the foreign university to which they are able to gain admission. Although high school type did not have a direct effect on the probability of being awarded a fellowship, it affected applicants' chances indirectly by determining access to undergraduate education first, and graduate education later.

Our findings also provided empirical evidence for the hypothesis that international university rankings indeed operate as a social stratification device. In the case of the Becas-Chile fellowships, this policy broadened the opportunities to access graduate education in foreign universities, which was previously a privilege for those who were able to afford it. However, according to the theories of social stratification, these expanded opportunities can be interpreted as a destabilizing mechanism pressing for social change, which prompted the use of rankings to assess the academic quality of applicants as a counteracting reaction and stabilizing device to maintain the social order. In a policy context of large social inequalities and a highly-stratified system of education, international rankings reinforce the position of privilege of individuals who had the opportunity to accrue educational advantages in high school and during their undergraduate studies. Therefore, our findings provide grounds to Altbach's argument that international university rankings tend to "*privilege the already privileged*" (Altbach 2006, p. 3).

It is important to remember that applicants for the fellowship in the sample were all accepted to at least one graduate program at a foreign university when they submitted their application for the fellowship. Gaining admission to a graduate program implies completing milestones and meeting requirements, which in itself can be considered meritorious. One can then argue that all applicants for the fellowship already demonstrated a high degree of individual agency and academic potential. As shown by the reviewed literature, given the fact that rankings do not necessarily measure universities' quality of teaching, nor the potential learning gains of attending a particular institution, using rankings as the criterion with the highest weight does not guarantee that the pool of applicants who were awarded the fellowship have more academic potential than those who did not earn it. What we do know for certain is that the latter attended, on average, lower quality secondary schools and undergraduate universities. Consequently, instead of being a merit-based indicator, our findings provide support to the theory that rankings constitute the necessary legitimizing ideology that is required to justify the unequal distribution of educational resources among applicants according to their socioeconomic backgrounds.

## 8. Implications for Policy Making and Recommendations for Future Studies

Our study has provided empirical evidence that, in a context of high social inequalities and a stratified education system, the use of international rankings as an awarding criterion tends to reinforce the position of privilege of individuals who accrued educational advantages in high school, as well as the disadvantages of those less fortunate who experienced fewer prior educational opportunities. In light of our findings, a critical question to ask is: Can Becas-Chile break this vicious cycle of inequality in the process of allocation of its graduate fellowships? There are some policies that have attempted to widen access to graduate education abroad, while simultaneously trying to counter the social reproduction effects in the selection of prospect fellows by incorporating programmatic elements that could effectively level the playing field for applicants of different social backgrounds.

In this regard, an example worth mentioning is a special fellowship launched in 2007 by the Chilean Fulbright Commission for Educational Exchange between Chile and the United States of America. This fellowship program, called U.S.-Chile Equal Opportunity Scholarship Program (BIO), was specifically tailored to reach academically-outstanding students who are not fluent in English. By providing the learning resources to become proficient in English through pre-graduate language training, the BIO fellowship provides the opportunity to a more diverse group of Chileans to pursue graduate studies at top-ranked universities in the United States, who would otherwise not be in a position to do so (U.S. Department of State 2007).

The BIO fellowship program offers fewer slots as compared with the regular Fulbright fellowship program, but they are exclusively reserved for applicants who graduated from public and subsidized schools. Both the BIO and the regular Fulbright fellowships are allocated using the same criteria, except for the cut-off score required on the Test of English as a Foreign Language (TOEFL). Additionally, acknowledging the complexities involved in the graduate admissions process to universities in the United States, all Fulbright fellows receive one-to-one academic advising to ensure that they are enrolled in graduate programs of high academic quality that best match their research interests and that provide the necessary conditions for them to complete their degrees successfully. Therefore, the English training and academic advising components of the Fulbright fellowship programs not only open a window of opportunity for those who were exposed to lower quality education, but also put in place mechanisms that would help fellows to overcome potential barriers to access and succeed in graduate education. Although the Fulbright program promotes admission to top-ranked universities, the potential impact of this emphasis on equity is offset by providing applicants with the necessary tools to gain admission to those universities.

Another promising policy that could inform Becas-Chile is the initiative of holistic evaluation that several graduate schools have implemented in the United States (for a general view of this topic, see Kent and McCarthy 2016). Admissions to graduate programs have traditionally relied heavily on the Graduate Record Examination (GRE) and other more specific admissions tests to select students (Posselt 2014 2016). Nonetheless, because admissions test performance is strongly correlated with socioeconomic status and race (Kent and McCarthy 2016), some programs have opted to either not use admissions test scores or to decrease its relative weight in the admission decision, while considering a broader spectrum of criteria. The adoption of a more holistic approach in admission processes aims to remove structural barriers that negatively affect access of historically underrepresented groups, by promoting more inclusive recruitment practices and designing a more optimal sequence for reviewing application materials. These practices can help prevent programs from rejecting strong applicants in early stages based on too few or inappropriate criteria (Kent and McCarthy 2016).

These examples show that it is possible to achieve the goal of widening educational opportunities without necessarily reinforcing existing educational inequalities (or at least trying not to), when there is an explicit political intention from governments and other stakeholders to do so. A more comprehensive review of alternative policy strategies and how effective they are in reducing inequalities is beyond the scope of our paper. Future research may focus on mapping out these strategies and their degree of effectiveness. Nonetheless, our short list of examples suggests that there might be a broader scope of policy choices worth considering to move toward a more egalitarian distribution of educational opportunities at the graduate level.

Although the Becas-Chile program was not designed to increase equity of access to graduate education, but rather to advance the country's stock of human capital, we argue that educational policies should be tailored in such a way that at least does not worsen existing educational inequalities. Relying on rankings to inform this policy goes in the opposite direction, and we considered it imperative to uncover and inform their effects. Undoubtedly, while Chile should strive for policies with the specific goal of reducing disparities of educational opportunities in K–12 education, policy makers should simultaneously ensure that the implementation of other policies at higher levels of education does not hinder accomplishing those goals. Fortunately, while in the process of writing this article, the Becas-Chile program reduced the weight assigned to the ranking in the process of evaluation from 40% to 20% for those pursuing doctorate degrees (CONICYT 2018b). Although these changes might not have completely mitigated the disadvantages associated with having studied in public and subsidized high schools, they are likely progressing in the right direction. Further studies may want to assess whether and by how much these changes in the selection criteria moderated the effects of the socioeconomic status of origin in the distribution of fellowships.

**Author Contributions:** Conceptualization, R.C., P.P.M. and C.G.V. Data curation, R.C. and P.P.M. Formal analysis, R.C. and P.P.M. Methodology, P.P.M. Writing, original draft, R.C. Writing, review and editing, P.P.M. and C.G.V.

**Conflicts of Interest:** The authors declare no conflict of interest.

## Appendix A. Fellowship Evaluation Criteria

**Table A1.** Fellowship evaluation criteria.

| Evaluation Criteria | Definitions | Masters | Doctorate |
|---|---|---|---|
| Academic and professional background | Academic and professional background | 30% | 20% |
| | Teaching and research experience | 5% | 12.5% |
| | Professional experience associated with the program | 5% | - |
| | Recommendation Letters | 5% | 7.50% |
| Study objectives | Study goals | 5% | 10% |
| | Clarity and consistency of study interests | 5% | 5% |
| | Applicants indicate how they will contribute to the country when they finish postgraduate studies | 5% | 5% |
| Academic quality of the postgraduate university | Positioning of the foreign university in ARWU or THE rankings, or other equivalent metrics that reflect the academic quality of the postgraduate program | 40% | 40% |

## Appendix B. Frequency of the 150 Top-Ranked Universities by Country

**Table A2.** Distribution of top-ranked universities by country.

| Country | ARWU | | QS | | THE | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| United States | 60 | 40 | 37 | 25 | 50 | 33 |
| United Kingdom | 17 | 11 | 24 | 16 | 22 | 15 |
| Germany | 7 | 5 | 7 | 5 | 15 | 10 |
| Netherlands | 8 | 5 | 8 | 5 | 10 | 7 |
| Australia | 8 | 5 | 8 | 5 | 8 | 5 |
| Switzerland | 6 | 4 | 6 | 4 | 6 | 4 |
| Canada | 5 | 3 | 6 | 4 | 6 | 4 |
| China | 6 | 4 | 7 | 5 | 4 | 3 |
| Sweden | 4 | 3 | 4 | 3 | 4 | 3 |
| Hong Kong | 1 | 1 | 5 | 3 | 4 | 3 |
| South Korea | 1 | 1 | 7 | 5 | 4 | 3 |
| France | 6 | 4 | 3 | 2 | 3 | 2 |
| Belgium | 3 | 2 | 2 | 1 | 3 | 2 |
| Japan | 5 | 3 | 8 | 5 | 2 | 1 |
| Denmark | 2 | 1 | 3 | 2 | 2 | 1 |
| Other | 11 | 7 | 15 | 10 | 7 | 5 |
| Total | 150 | 100 | 150 | 100 | 150 | 100 |

## Appendix C. Mplus Syntax

```
TITLE: Path Analysis Becas-Chile-Final Model

DATA:
    FILE = becaschilemplus.csv;

VARIABLE:
    NAMES ARE
    uniqueid fawarded hspub hssub quality ranking appscore phd female notmet natsc;
    USEVARIABLES ARE
    id fawarded hspub hssub quality ranking appscore phd female notmet natsc;
    IDVARIABLE IS uniqueid;
    CATEGORICAL ARE fawarded;
    MISSING ARE all (-999999);

DEFINE:
    STANDARDIZE ranking quality appscore;

MODEL:
    hssub; hspub; ranking; notmet;
    fawarded ON appscore phd;
    appscore ON ranking quality natsc phd;
    ranking ON hspub hssub quality notmet female phd;
    quality ON hspub hssub notmet;

ANALYSIS:
    ESTIMATOR = wlsmv;
    BOOTSTRAP = 10000;
    PROCESSORS = 8;

MODEL INDIRECT:
    fawarded IND hspub;
    fawarded IND hssub;
    fawarded IND notmet;
    fawarded IND quality;
    fawarded IND ranking;
    ranking IND hspub;
    ranking IND hssub;

OUTPUT: stdy stdyx sampstat cinterval(bootstrap);
```

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