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Reducing inequality in access to university in Chile: the relative contribution of cultural capital and financial aid

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Abstract
In 2016, Chile implemented a policy of free higher education (gratuity) for secondary school graduates from families in the lower income range. One of the stated objectives of the new policy was to increase the access of secondary school graduates from families with lower levels of education. To answer that concern, we analyzed administrative data from more than 800,000 students seeking university admission in 2012, 2015, and 2019. Our objective was to determine whether an increased proportion of "first-generation" students had been admitted to selective universities. The results show that between 2015 and 2019, the impact of the gratuity on first-generation admissions was marginal. It was of some importance only for those secondary school graduates from public schools and those who had been enrolled in the technical-professional track. The enrollment rate of these groups increased 2.2 and 2.7%, respectively. In sum, the effect of the introduction of gratuity on enrollment of first-generation students was not as impressive as expected. It has acted principally as an alternative source of finance, reducing use of other forms such as bank loans and scholarships. These results challenge directly the hypothesis that inequity in access to university is primarily attributable to financial difficulties.

Keywords Parents' education · Admission criteria · Tuition-free university · Secondary school track · First-generation · Chile

Introduction

With the increase of wealth gained through industrialization and commerce, universities expanded but for a long while remained free institutions for the elite, enrolling less than 10% of those 18 to 21 (Trow, 1972). The USA was the first country to pass from what Trow

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(1972) called the "elite" phase to "mass" enrollment (Cantwell et al., 2018). Enrollments climbed to 16% of the age group by 1940, most in free public institutions. By 1970, higher education in the USA was approaching an enrollment rate of 50%, which Trow (1972) designated as the boundary of "universal" higher education. Today, only a relatively small set of countries have reached an enrollment of more than 50% of their high school graduates in higher education.

In each of those countries that enrolled more than 50% of their graduates, rapid expansion of enrollments has been accompanied by serious issues of social and economic equity. Some researchers argue that expansion of access contributed to social and economic inequity because upper income families, seeking to protect their social and economic status, enrolled their children while lower-income families did not (Pfeffer & Hertel, 2015). Increased enrollments and increased per unit costs overwhelmed government budgets forcing a reduction in or elimination of free public higher education (Marginson, 2016). Cantwell and colleagues conclude that mere expansion, without ensuring low costs, does not contribute to a redistribution of opportunities (Cantwell et al., 2018).

The expansion of access to university education in Chile and elsewhere is a relatively new phenomenon in a long history. The first universities were established to prepare the next generation of the dominant or ruling class (Craib, 2016). Until the end of the twentieth century, publicly financed institutions in Chile enrolled only a small fraction of youth 18 to 21 years of age.

In Chile, the cost of higher education to families rose when a conservative military government (1973–1989) chose to reduce subsidies to public universities and to authorize new private universities and post-secondary programs. Public spending on higher education as a proportion of the total spending in the education sector was reduced from 30 to 15% (Espinoza, 2002). The effect was to create a competitive market among private institutions with high demand and high costs (Jarpa & Rodríguez, 2017).

The Chilean system of higher education consists of two sets of institutions which differ in admission practices. In one are some private universities and higher education institutes that admit students directly. In the second, larger group are public and private universities that are selective in their admission. All applicants are required to take a Test of University Selection (PSU) [1] administered by a central agency. After receiving their test scores, students indicate their preferences for up to 10 universities and degree programs. Each university (and their degree programs) lists the minimal level of secondary school grades and test scores required for admission. These requirements, and their weight in the admission decision, also vary by university and degree program. The agency then determines an applicant's acceptance to a specific university and degree program starting with the student's highest preference and working downward until admitted or there are no open vacancies. Once admitted by a university, the student can then accept and be enrolled, or decline (DEMRE 2020)

Increased university attendance by upper-income groups moved the system into the mass education phase. After 1989, democratically elected governments in Chile, seeking to benefit lower-income students, offered secondary school graduates merit scholarships for university enrollment based on academic and standardized test performance. Loans were offered to applicants with lower-income levels and performance (Espinoza & González 2013, 2015;

[1] For information on the reliability and validity of the PSU see Pearson (2013). This study is based on a version of the PSU used in the years indicated. In 2020 applicants took a revised, temporary form of the PSU test, similar in design to the earlier version but slightly shorter in length. This was called PTU.

Meneses & Blanco, 2010; Santelices et al., 2016). By 2017, only one-third of the country's expenditure on higher education came from public sources. The larger portion was from private sources, primarily households that contributed almost 60% of total spending on higher education (OECD, 2020).

Enrollments grew rapidly, from 180,800 in 1984 to 1,144,184 in 2020 (Consejo Nacional de Educación, 2020). The increase in size produced a profound change in the profile of students: the new group included a majority of students whose parents had not themselves attended university (Castillo & Cabezas, 2010). These were called "first-generation" students.

Despite increased enrollment, however, the system continued to be socially and educationally segmented (Jarpa & Rodríguez, 2021). Although all social groups increased their participation in higher education, they did not do so at the same rate. The proportion of lower-income youth (quintiles 1 and 2) in higher education grew slowly. In 1987, 3.7% of youth from the bottom income quintile were enrolled in higher education; by 1998, the enrollment rate had increased to 6.1%. The proportion of youth in the top income quintile attending universities increased from 44.6% in 1987 to 58.8%, a gain of 14.2% (Espinoza, 2008). By 2017, 61.2% of university-age students in the top income decile were in a higher education institution, compared to 28.4% of students in the bottom income decile (Ministerio de Desarrollo Social, 2018).

This phenomenon is consistent with Lucas' theory of "effectively maintained inequality" (EMI) (2001). Expansion of higher education did little to increase the relative proportion of low social origin students entering selective universities (Espinoza, 2017; Consejo Nacional de Educación, 2020). In contrast, high social origin students have tended to concentrate in the most selective universities (Leyton et al., 2012; Programa de las Naciones Unidas para el Desarrollo 2017). Various studies have shown that differences in prior education levels are reflected in inequalities in admission (Koljatic & Silva 2006, 2010; Rodríguez & Jarpa, 2015; González & Dupriez, 2017). One hypothesis is that the inequalities are the effect of differences in the cultural capital of applicants. On average, students whose parents had no higher education tend to have less access to information, cultural goods, and social networks than do parents with more education (Canales & De los Ríos, 2009; Wright, 2019). The immediate effect of this imbalance is reflected in a lesser development of the academic abilities essential to respond to selection tests, which presume that the student has been exposed to the full school curriculum. A second hypothesis is that even when a student does have the necessary academic abilities to perform well on tests, the high financial costs of higher education inhibit application and enrollment of low-income students. The students whose parents have fewer economic resources are less disposed to forego income by spending several years in the university instead of entering the labor market immediately (Callender & Mason, 2017; O'Shea et al., 2018; Covarrubias et al., 2020).

Unrest in Chile exploded in 2011 with national demonstrations by (mostly lower income) university students (Bellei & Cabalin, 2013; Cummings, 2015). A major complaint was the high cost of enrollment even in public institutions (Disi Pavlic, 2015). Several universities were closed by student strikes, and university students died in violent street protests (Cini & Guzmán-Concha, 2017; Palacios-Valladares, 2017). In response, the government proposed free tuition, or "gratuity," for secondary school graduates from families in the lower six deciles of the household income distribution (Ministerio de Educación, 2018).

Gratuity was initiated in 2016 (Espinoza & González, 2017; Delisle & Bernasconi, 2018), intially affecting 140,000 students. By 2020, the number of beneficiaries has exceeded 400,000 (Ministerio de Educación, 2020). The growth in the number of beneficiaries made this type of public financial aid more important than scholarships or loans (Contraloría General

de la República, 2019). The gratuity or grant covers fees and tuition for the length of the degree program in which enrolled. Students can apply to any of those universities enrolled in the program that are accredited for at least four years by the National Accreditation Commission (Ministerio de Educación, 2020).

Despite the attention that gratuity has received from its first appearance, its effects on access have not yet been studied in depth. Nor has the impact of gratuity on first-generation students in selective universities been analyzed. In this study, we assumed that first-generation students have low levels of cultural capital. We posed the following research questions: (a) did the number of first-generation students entering selective universities increase with the introduction of gratuity and (b) did the proportion of entering first-generation students vary with their gender, type of secondary school attended, or secondary school track.

This paper is an attempt to assess whether the new policy of free tuition for low-income students has resulted in more equitable access to university education. Evidence for this will be an increase in the proportion of first-generation students enrolled in selective universities.

Review of prior research

Two common explanations of why university of secondary school graduates fail to gain access to university are lack of interest and lack of financial resources. The two proposed causes share a common origin, the education of their parents.

First-generation status and lack of interest

University students raised in families in which parents have had little or no higher education are sometimes referred to as "first-generation" students (Hoffmann, 1965). They are said to differ from continuing-generation students in several ways that put them at a disadvantage. Parents without education and few economic resources are seen as raising children with a set of values, knowledge, and skills different from those required for success in the university (DeBacker & Routon, 2017; Hossler & Stage, 1964; Hunt et al., 2018; Kremer et al., 2019; Rimkute et al., 2012).

The cultural capital perspective argues that children exposed to the values and practices of parents and other family members develop a habitus (Bourdieu & Passeron, 1990), a largely unconscious constellation of preferences, behaviors, and styles of self-presentation that persists into adolescence and early adult life and influences the children educational trajectories (Grodsky & Rieglecrumb, 2010). Parents' attitudes can influence their child's interest in higher education and even choice of field (O`Shea, 2016; Hunt et al., 2018; Mitchall & Jaeger, 2018). Parents may promote university study as leading to a more secure financial future, or as a means to raise one's self-esteem (Danilowics-Gosele et. al., 2017; Garza & Fullerton, 2018; O'Shea et al., 2018; Covarrubias et al., 2020). Research on school-aged children in Australia has identified three distinct patterns of encouragement: parents project their own frustrated ambitions onto their children; parents recognize and encourage the academic abilities of their children; and parents provide active support in learning more about and preparing for higher education (Patfield et al., 2020). Parents without university education are less likely to support their children in this third way.

University policies and practices are designed to match the values, interests, and prior knowledge of upper-income children of well-educated parents. Secondary school students with less-educated parents observe the differences in habitus between them and their wealthier classmates and come to believe that they do not belong in the university (Bennett, 2001; Stephens et al., 2014).

Until recently it has seemed that compared to their classmates with middle- and upper-income parents, students whose parents have less education have a lower level of cultural and social capital (Wright, 2019). This may be changing. Youth today are more likely to rely on social media for sources of information (Wohn et al., 2013). Depending on the web sites they visit, first-generation youth can be exposed to the same values as those with more educated parents. Continuing-generation students, on the other hand, may be exposed to perspectives that discourage further education. For example, a study in Pakistan found that university students were more critical about their education if they were heavy users of social media (Abbas et al., 2019).

Lack of required resources

An alternative but complementary explanation for inequity in access argues that in today's world, while it is true that first-generation students lack cultural capital, it is physical capital that determines whether a secondary school graduate will apply for university admission. In many economies, only the children of wealthy parents can afford to postpone income from employment; most children have to contribute to family welfare by going to work right after secondary school. In countries with stronger economies, parents are more likely to have had some measure of higher education. In these cases, they may generate the social and cultural capital that motivates some of their children, most likely a male child, to aspire to higher education (Papert, 1995; O'Shea, 2016; O'Shea et al., 2018; Chui et al., 2019; Covarrubias et al., 2020).

Work now or study now? Not all secondary school graduates choose to enter or even apply to higher education. A critical influence on the decision is the family's capacity to do without the income that the child would have produced if working. Even in countries with enrollment rates over 50% of the age group, a significant proportion of secondary school graduates choose to work after graduation, get married and raise a family, or engage in some other activity different than attend the university. Despite increased university openings, enrollments in industrial countries have declined during periods of sustained economic prosperity and high employment (Fain, 2018). In times of economic slowdown, on the other hand, higher education may be seen as a better alternative than low-paid employment. A university degree may be seen as promising better and better-paying employment and increased financial security in the long term (O'Shea et al., 2018).

The costs of higher education One constraint to enrollment is a family's ability to meet the direct cost of enrollment and maintenance (Callender & Mason, 2017). When financial conditions are difficult and the academic ability of the student is unclear, families are less likely to take loans (Xue & Xia Chao, 2015). A study in England reported this to be especially true of families of female and first-generation students (de Gayardon et al., 2019).

Chilean research on the effect of parents' education

Consistent with the cultural capital hypothesis, Chilean research has emphasized that parents' level of education has a significant impact on their children's aspirations and performance. The term "first-generation" have been used in research on level of parents' education, but there is no agreement on how the terms should be defined operationally. Some researchers designate "first-generation" to refer to students whose parents have had no amount of higher education

(Flanagan, 2017); others have included students whose parents did not graduate from university (García de Fanelli & Adrogué, 2019). In some studies, one parent as a graduate is sufficient to exclude a student from the first-generation category, while in other studies, both parents must have graduated (Jarpa & Rodríguez, 2017).[2]

Exploratory studies have used a phenomenological approach and a critical theory perspective to interpret "first-generation" student's experiences (Flanagan, 2017; Segovia & Flanagan, 2019). A study comparing first-generation students in three universities in one city emphasized the importance of parents both as inspiration for university enrollment and as a motivation for students' performance once enrolled (Soto Hernández, 2016). Parents' level of education and level of income influence where and what students study in secondary school. Students beginning secondary education can choose between two curriculum tracks. The technical-professional track prepares students for employment on graduation, but graduates can apply for admission to a university. The scientific-humanistic track prepares students for the PSU; the technical professional track in secondary school does not. Only public (municipal) and voucher private schools offer both tracks; private schools offer only the scientific-humanistic track. Many low-income families can not afford the costs of most voucher private schools (McEwan, 2002; McEwan et al., 2008). Research in Chile indicates a gap in curriculum coverage in schools in lower-income areas (Rodríguez & Jarpa, 2015).

Students in lower-income families are more likely to enroll in the technical-professional track in secondary school (Flores & Carrasco, 2013). If they do seek post-secondary education, they are more likely to enroll in a technical-professional program that offers 1 or 2-year training programs (Catalán, 2016). Other studies have shown that the decision by secondary school graduates of the technical-professional track to attend university is related to the level of education of their parents (Antivilo-Bruna et al., 2017).

Chilean students applying for admission to a university can indicate their preferences of field of study (or degree program). Admission is to a particular field (and transfers are difficult). Using data from university admission applications for the years 2000 to 2015 (prior to the new gratuity regime), researchers inferred that the choices of first-generation students were determined primarily in terms of their social, economic, and cultural capital, that is, their habitus (Jarpa & Rodríguez, 2017; Canales, 2016). A study of admissions during the 2000–2015 period found that first-generation applicants were less likely to be admitted than were continuing-generation applicants (Jarpa & Rodríguez, 2021).

Despite the attention that gratuity has received, impact on first-generation students has been studied only indirectly. For example, Arzola (2021) looked at the effect in low-income students only in its first year of implementation. Bucarey (2018) simulated the effect of gratuity as if it were made universal and concluded that about 20% of the poorest students currently admitted would be excluded. Flores et al. (2020) studied the influence of gratuity on learning outcomes in one professional institute. They found that gratuity had a positive effect, especially for students who previously had to finance part of their studies.

Methods

This is a quantitative study that compares attributes of the more than 800,000 applicants for the PSU, and the more than 200,000 applicants admitted in selective universities in 2012, 2015, and 2019. This range of years was chosen in order to compare the effect of introducing

[2] University students whose parents did attend university are called "continuing"-generation.

gratuity. The minimum score required for university admission is 450 (of a total of 850). Only applicants reaching this level were included in the analysis.

Data were provided by the Department of Evaluation, Measurement and Educational Enrollment (DEMRE) of the University of Chile, which is responsible for the operation of the national Uniform Admission System (SUA). The SUA application form solicits and verifies the following information: student's age and gender; family composition and family size; parents' education; parents' occupation, occupational status, and type and sector of employment; family income; and secondary school from which graduated and track followed (Humanities-Sciences or Technical-Professional). Grade point averages and scores on the PSU Language and Mathematics tests are required for all applicants.

Before 2012, only the 25 public and private universities that were members of the Council of Rectors of Chilean Universities (CRUCH) participated in the Uniform Admission System. In 2012, nine more private universities joined the system. For clarity, the analysis that follows indicates results for the original CRUCH institutions, and separately for the 2012 Entrance group.

The study uses cross tabular analysis to compare these cohorts in terms of family education, gender, secondary school attended, and secondary school track. The effect of introduction of gratuity is demonstrated by comparing data for first-generation (FG) students with data for continuing-generation (Continuing) students. Continuing students are defined as those with one or both parent who had attended any amount of higher education. FG students are those whose parents never attended higher education. If one parent was not listed, that case was considered as if neither had attended higher education. Those cases where both parents were not listed were excluded from the analysis.

Results

The first column in Table 1 shows the distribution of FG and Continuing students who took the PSU. The second column shows the proportion of students of each group obtaining scores of 450 or above, for each of the 3 years. Note that the number and composition of applicants did not change greatly during the 7 year period; FG applicants were about 65% of the total. The table shows that the two groups, FG and Continuing, differed in the percentage that achieved the minimal entrance score of 450. The gap between the two reduced slightly over time but was as high as 25% in 2019.

Table 2, column 1, shows the proportion of FG and Continuing students entering CRUCH and private universities. Column 2 shows the enrollment for each of the 3 years studied. Over the period, there is a slight increase in the proportion of entering students who are FG. About half of those enrolling in CRUCH universities were FG, and of those entering in the 2012 Entrance group of private universities about one-third.

Comparing the two time periods, 2012–2015 and 2015–2019, there are differences in the relative entrance rates of the two groups of students. For the CRUCH universities, the proportion of FG students who enter increased for both periods, but because Continuing students between 2012 and 2015 entered at an even higher rate, the proportion of enrolled students who were FG declined, from 48.1 to 46.3%. Between 2015 and 2019, however, the pattern was reversed, with FG students increasing from 46.3 of total entrants to 51.5%. In the 2012 Entrance group of universities, however, there was a steady increase of FG students, from 6.2 to 7.1 and then to 8.1%. As a consequence, the FG proportion of total entrants in the 2012 Entrance group of universities increased 0.8% in the first period and 6.5% in the second.

Table 1 Distribution of FG and Continuing applicants taking the PSU, by level of parents' education and PSU scores at or above 450 (2012–2019)

	Percent of applicants who took PSU			Percent obtaining >=450		
	2012	2015	2019	2012	2015	2019
FG	65.5	63.1	65.5	46.8	57.6	50.4
Continuing	34.5	36.9	34.5	74.7	84.1	75.0
N	259,838	268,042	292,792			

The proportion of FG students entering increased in both groups of universities over time but had a greater effect on FG enrollment in the 2015–2019 period. This could be attributable to the gratuity, which motivated the participation of the socially disadvantaged students.

Table 3 presents the proportion of FG and Continuing students among those scoring 450 or higher who enrolled in 2012, 2015, or 2019 in each group of universities, taking gender into account. The results are consistent with the results shown in Table 1 with respect to the difference in profiles of entrance to different groups of universities. While men were more likely than women to enter a CRUCH university, the relationship is the opposite in the 2012 Entrance universities, independent of parents' education.

In the CRUCH case, the ratio of women to men increased in the 2012–2015 period, for Continuing as well as for FG students. In the period 2015–2019, however, the ratio of entering students changed according to parents' level of education, independent of gender. The participation of FG of both genders increased 0.5%, while it declined for Continuing students. Similar changes occurred with respect to students enrolling in 2012 Entrance universities, all groups increasing except for Continuing women.

Based on the results, it is possible to infer that gratuity had an impact on attendance at CRUCH universities. The increased enrollment of FG students of both genders in the 2015–2019 period broke the pattern observed for the earlier period (increase of women and decrease of men independent of parents' education). In the 2012 Entrance universities, there are no observable changes between periods that could be attributable to gratuity or other events occurring between 2015 and 2019.

A third factor related to the probability that a given applicant will gain university access is the secondary school from which she/he graduated. Table 4 shows the proportion of entering students in 2012, 2015, and 2019 according to the type of secondary school from which they graduated. In the 2012–2105 period, the proportion of FG students enrolling in CRUCH

Table 2 Proportion of entering students obtaining PSU scores at or above 450 by parent's education level and distribution by group of universities (2012–2019)

Group of universities	Parents' ed level	Percent of level enrolled			Distribution of enrollment		
		2012	2015	2019	2012	2015	2019
CRUCH	FG	28.0	28.9	29.4	48.1	46.3	51.5
	Continuing	35.9	36.2	35.4	51.9	53.7	48.5
	N	46.385	50.745	55.292	46.385	50.745	55.292
2012 Entrance	FG	6.2	7.1	8.1	29.3	30.1	36.6
	Continuing	17.8	17.9	17.9	70.7	69.9	63.4
	N	16.886	19.256	21.430	16.886	19.256	21.430

Table 3 Proportion of enrolled students scoring 450 or above by level of parental education and by gender (2012–2019)

Group of universities	Parents' ed level	Female			Male		
		2012	2015	2019	2012	2015	2019
CRUCH	FG	25.5	27.9	28.4	30.9	30.1	30.6
	Continuing	32.8	33.7	33.2	39.4	38.8	37.8
	N	22.051	24.711	27.737	24.334	26.034	27.555
2012 Entrance	FG	6.6	7.5	8.4	5.8	6.8	7.7
	Continuing	18.9	18.7	18.5	16.7	17.1	17.4
	N	9.247	10.286	11.581	7.639	8.970	9.849

universities coming from municipal and voucher schools increased slightly (0.6 and 1.3%, respectively). The increase of Continuing students was even less (0.3 and 0.4%). The proportion of enrolling FG students who had graduated from private school decreased 0.2%. In the 2015–2019 period, the proportion of enrolling FG students from municipal schools increased 2.2%; the proportion from voucher schools declined 0.2%, and those from private schools increased 0.5%.

With respect to the 2012 Entrance universities, between 2012 and 2015 enrollments of both FG and Continuing students from municipal and voucher schools increased, while those from private schools decreased. In the 2015–2019 period, however, only graduates of voucher schools increased their enrollment rate. The increase was greatest for FG students (from 8.0 to 9.0%). Changes in enrollment rates were small for municipal and private schools. Changes in enrollment rates for FG students were 0.2 and 0.1%, respectively; rates for Continuing students declined, 1.1 and 2.7%, respectively.

Table 5 shows the university entering rate according to the track taken in secondary school. For those entering the CRUCH universities, entering rates went up in the period 2012–2015, for both FG and Continuing students. During the 2015–2019 period, however, only the proportion of students who had taken the technical-professional (TP) track increased. The increase was larger for the FG students than for the Continuing, 2.7 as compared to 1.3%. On the other hand, the rate for both FG and Continuing student who had taken the science-humanities track (SH) declined about 1.0%.

Among the students entering the 2012 Entrance universities, the rates are same for both periods, with the enrollment rate of TP students increasing independently of parents' education level. For those who had graduated from the SH track, only the FG students' rate increased.

Table 4 Proportion of enrolled students scoring 450 or above by level of parental education and types of secondary schools attended (2012–2019)

Group of universities	Parents' ed level	Municipal			Voucher			Private		
		2012	2015	2019	2012	2015	2019	2012	2015	2019
CRUCH	FG	28.8	29.4	31.6	27.5	28.8	28.3	28.9	28.7	28.9
	Continuing	36.9	37.2	37.0	35.7	36.1	34.3	36.1	36.5	37.0
	N	13.786	14.228	16.232	25.304	28.587	29.112	7.039	7.701	9.620
2012 Entrance	FG	4.2	5.1	5.3	7.0	8.0	9.0	25.4	23.0	23.1
	Continuing	8.4	10.2	9.1	12.6	12.9	13.2	34.6	33.4	30.7
	N	2.359	2.959	3.114	7.755	9.153	10.128	6.653	6.898	7.962

Table 5 Proportion of enrolled students with scores of 450 or above by level of parental education and secondary school track (2012–2019)

	Parents' Ed level	Technical professional			Scientific humanistic		
		2012	2015	2019	2012	2015	2019
CRUCH	FG	19.0	19.7	22.4	32.3	33.0	32.3
	Continuing	22.8	23.3	24.6	36.9	37.2	36.3
	N	5.940	6.147	7.009	40.445	44.598	47.955
2012 Entrance	FG	3.2	3.6	4.2	7.7	8.7	9.6
	Continuing	4.3	4.9	6.0	18.8	18.9	18.8
	N	1.013	1.164	1.379	15.873	18.092	19.825

The entrance rate of FG from the TP track went from 3.2 to 4.2% during 2012–2019, while that of the SH track rose from 7.7 to 9.6%.

There was no difference between the two periods in changes in the enrollment rates of the 2012 Entrance universities. There were, however, changes between periods in enrollment rates into the CRUCH universities. In the first period, 2012–2015, both FG and Continuing students from both secondary school tracks increased. In the second period, only the enrollment rate for TP graduates increased, the larger rate being for FG students. The implementation of gratuity, therefore, affected the behavior of TP graduates most, especially those whose parents had not university experience.

Discussion

The results reaffirm those obtained for the pre-gratuity period of 2000–2015 (Jarpa & Rodríguez, 2021). First-generation students enroll in selective universities at a lower rate than do Continuing students. Although the FG rate increases slightly for the 2015–2019 period, the increase is small. Furthermore, the results of a recent study show that after 1 year of gratuity, enrollment rates have remained constant (Arzola, 2021). The conclusion drawn by Arzola is that gratuity had less than 1% impact on the university enrollment rate of qualified lower SES students.

Although there is only a small effect on enrollment, gratuity does affect some FG students more than others. This is especially true for students applying to the CRUCH universities. There was a significant increase in enrollment of FG students who graduated from public secondaries, and of those who took the technical-professional track. The students who attended public schools, those who took the TP track, and those who enrolled in CRUCH universities are more frequently from lower-income families (Flores & Carrasco, 2013; Fleet & Guzmán-Concha, 2017).

Prior research offers two explanations for why disadvantaged students are less likely to seek enrollment in, and be admitted to, a university. One is that they have lower levels of cultural capital, which results in lower academic performance and ambitions, and the other is that they lack the financial resources necessary to attend university (Canales & De los Ríos, 2009; Callender & Mason, 2017; O'Shea et al., 2018; Wright, 2019; Covarrubias et al., 2020). The marginal impact of gratuity on enrollment rates found in this study suggests that the first reason is more important than the second. Before the gratuity policy was introduced, low-income students had access to other sources of financial resources. The effect of gratuity was to

substitute for those existing sources of finance, without attracting lower-income students. In recent years the introduction of gratuity by the state diminished reliance on loans and scholarships (CGR 2019). Data from Red Indices (2018) shows that the proportion of students taking loans for university study was constant at about 30% until 2016 and declined 10 points by 2018. In other words, the importance of the gratuity policy could be not so much one of increased access to higher education by lower-income students, as one of improving performance once enrolled. This argument is implied, but not yet convincingly proven in preliminary results from one non-university institution (Flores et al., 2020).

Therefore, the lack of economic resources to pay for their studies may not explain the relative non-enrollment of first-generation students. Rather it may be the result of inequalities in cultural capital (Giraldo-Zuluaga, 2015). In Chile, this factor is consistent with a school system stratified along social class lines (OECD, 2004), and reinforced by the actions taken by different types of schools that affect admission test scores (González & Dupriez, 2017). Prior research found a relationship among the type of school (public, voucher, private), school track (technical professional, scientific humanistic), and scores on the PSU admission test (Geiser & Santelices, 2007; Koljatic & Silva, 2006, 2010; Valdivieso et al., 2006; Contreras et al., 2007; Farías & Carrasco, 2012; Rodríguez-Garcés & Jarpa, 2015).

Schools can be a second source of cultural capital. The type of school attended (public, voucher, private) is related to parents' level of education. Over and above the effects of family, however, PSU scores are related to type of school attended (Larroucau et al., 2015). The implication is that schools differ in their ability (or effort given) to prepare students for the PSU admission test. Selective universities rely on the PSU to identify those applicants will be good students. This confidence is based on validity studies that showed that PSU scores correlated significantly (although not highly) with first-year university grades (Pearson, 2013). A more recent study showed, however, that the secondary school GPA, ignoring type of school, was a better predictor of performance than PSU scores (Vergara-Díaz & Peredo López, 2017). None of the studies cited above included first-generation status as a variable, however. The results of this study make clear that the marginal effect of university gratuity on enrollment of first-generation students can be attributed more to inequalities in the structure of the educational system than to students' ability to pay university fees.

Conclusion

This study confirmed results of previous research that children's educational ambitions are related to parents' level of education. The relationship is not deterministic, however. Many children of parents without university education aspire to go to university and many of these have the requisite academic skills to succeed once admitted. Is the lack of financial resources the major reason why a much smaller proportion of lower-income students, first-generaton students, are enrolled in higher education?

This study calls into question the argument that cost is the major cause of inequality in higher education. The analysis shows that in Chile, a policy of free tuition, or gratuity, for lower-income applicants has reduced only marginally the gap in university enrollment between students whose parents have little or no higher education, and those who parents are university graduates. Further analysis suggests an alternative hypothesis that university selection procedures are a more important source of exclusion.

It is clear that parents' level of education is related to applicants' admission test scores. In addition, however, parents' education is related to the type of secondary school attended and the track studied in secondary. Holding level of parents' education constant, the secondary school experience has its own effect on admission test scores. The two factors, parents' education and preparation for the selection test in secondary schools, can act independently of the applicant's academic abilities and motivation to succeed in university, maintaining current inequality. Gratuity has made a positive contribution to equity of access, but this impact will continue to be limited if the selection process is based on measures of academic ability that are linked, directly and indirectly, to the social origin of prospective students.

This is not an argument against financing the education of lower-income applicants to the university. On the contrary, all qualified applicants have a right to education, no matter what was denied their parents. Increased diversity in admissions and graduation will increase the range of abilities and creative energies available to society. Their contributions will be of inestimable value for generations to come. Current admission policies tend to exclude those lacking the social and cultural knowledge and skills thought to facilitate academic success, especially in the first year of study. The critical question is, how should universities transform themselves to educate the more diverse population they should serve in the future?

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Declarations

Conflict of interest The authors declare no competing interests.

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