Who Is Left Out? Inequalities in Higher Education Admissions and Placements in Portugal

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INTRODUCTION

Access to higher education is an important area of state regulation which has the potential to impact the social and economic development of a country (Magalhães et al., 2009), being used to fulfil different political goals. Despite corresponding to the democratic ideal of social justice, equality is not the same as equity (Espinoza, 2007). While the former

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O. Tavares et al. (eds.), *Equity Policies in Global Higher Education*,
Issues in Higher Education,

https://doi.org/10.1007/978-3-030-69691-7_8

implies giving equal opportunities regardless of background and condition, equity implies equal shares determined by need, expended effort, ability to pay, achieved results, ascription to any group or resources and opportunities available (Larkin & Statton, 2001). Therefore, in many cases, more ‘equity’ may require different treatment and consequently less ‘equality’ (Rawls, 2009).

After the 1974 democratic revolution, Portuguese governments assumed equality as a political goal and took the responsibility of expanding higher education, leaving behind an elitist system. The expansion was followed by a period of ‘normalisation’ (Magalhães et al., 2009) between 1976 and 1986. As public universities were not able to accommodate the increasing number of students, coming from different socioeconomic backgrounds, Portuguese higher education was the object of a process of diversification. Polytechnics and private institutions were created and launched, having economic and social development as a political goal.

Due to a combination of factors, such as a diminishing number of students graduating from secondary education, a decline in birth rates and more demanding access rules, the mid-1990s was marked by a decreasing number of candidates in higher education. Consolidation, through attention to the quality of provision, became the new political goal (Magalhães et al., 2009).

The number of places in public higher education institutions has been higher than the number of candidates, except in 2017 (DGES, 2018). However, if private provision is also considered, the number of places in the higher education system as a whole exceeds the number of candidates. Students are, in principle, able to choose a university or a polytechnic, a public or a private institution and a particular study programme from a wide range of alternatives (Sá & Tavares, 2018; Tavares, 2013; Tavares & Cardoso, 2013). In such context, one would expect inequalities to be significantly reduced. However, the expectation that democratisation of higher education would be achieved through massification has failed to materialise (Magalhães et al., 2009).

A large proportion of potential candidates is left out, either because they do not apply or because their application has not been successful (Sá & Tavares, 2018). Indeed, 41% of 19 and 20-year olds in 2017 were enrolled in higher education, above the OECD and EU23, while for 21-year olds and above the Portuguese average is below the OECD and the EU23 ones (CNE, 2019). Moreover, there are candidates that, although applying and entering higher education, are not allocated to

their top preferences, as places are conditioned by *numeri clausi* and by competition for the most reputed institutions or study programmes. This signals a possible selectivity and stratification of Portuguese higher education, which might be indicative of persisting inequalities. In fact, as argued by Magalhães et al. (2009), a stratified higher education system seems to prevail in Portugal, and it prevents students from choosing some institutions and some study programmes. Moreover, Portuguese higher education is not yet achieving European standards, especially in terms of the percentage of graduates. According to Eurostat data, in 2017, Portugal lied below the average of the European Union in terms of tertiary education attainment for the age group of 30 to 34 years old, with 33.9% compared to 39.7%.

This chapter analyses why inequalities might persist in access to higher education and in the choice of the more selective institutions or programmes. It aims to (i) identify and characterise the group of unsuccessful applicants; (ii) analyse the probability of a student being placed in his/her preferred study programme/institution; and (iii) determine the influence of cultural and socioeconomic background on entry to the most selective study programmes. For the first two aims, the study draws on a dataset containing all applicants to Portuguese public HEIs, from 2012 to 2018. Gender, region and grade point average will be used as explanatory variables. Regarding the socioeconomic background, the chapter relies on a dataset from 2017/18 with the students enrolled in the first year, that contains information on the parents' educational background and whether or not they get scholarships.

First, the chapter gives an overview of the persistence of inequalities in Portugal, relating them with the two theoretical hypotheses, the Maximally Maintained Inequality (MMI) and the Effectively Maintained Inequality (EMI). Both hypotheses can be useful when approaching inequalities in access to and within higher education. Second, the chapter shows the methodological steps taken to treat data. Then the main findings are presented and discussed also through the lens of MMI and EMI on inequalities. A final conclusion is drawn.

PERSISTENCE OF EDUCATIONAL INEQUALITIES IN PORTUGAL

The massification of participation in education was expected to reduce the advantage that students from privileged socioeconomic backgrounds had over students of lower socioeconomic status. Nonetheless, this

expectation failed to materialise because educational inequalities persisted despite the expansion of schooling at pre-tertiary (Halsey et al., 1980) and tertiary levels (Chesters & Watson, 2013; Lynch & O’riordan, 1998; Tsui, 2003). According to Amaral (this volume), the Maximally Maintained Inequality theory (Raftery & Hout, 1993) posits that the persistence of inequalities derives from the fact that the lower classes can only take advantage of opportunities offered by expansion when the needs of the upper classes are fully satisfied. In Portugal this was evident when students from lower backgrounds could only access higher education when the system expanded to include new universities, polytechnic institutions and a private sector. The expectation was that higher education would cover the entire Portuguese territory, thus reducing regional asymmetries. However, what happened was that regional coverage happened much more through polytechnics, which offered more vocational and short-term education, while the private sector ended up concentrated in large coastal urban regions, with greater population density, neglecting inland regions, where low demand made its sustainability problematic. Therefore, the country’s regional coverage ended up being ensured mainly through the polytechnic institutions.

This diversification of higher education has improved the chances of students of low socioeconomic status to study at tertiary level. Students were, in principle, able to choose a university or a polytechnic institution, a public or a private institution and a specific study programme from a wide variety of alternatives (Sá & Tavares, 2018; Tavares, 2013; Tavares & Cardoso, 2013). However, what has happened is that only a few students can actually choose, that is, those who have the best grade point averages (GPA). An average student, with an average application grade, cannot choose a medical degree or an engineering and industrial management study programme as the *numerus clausus* system turns these programmes very selective.

Therefore, the system has become socially stratified, with disadvantaged students participating mostly in institutions and programmes which are less reputed and less sought for by students from affluent backgrounds. The expectation that diversification would also expand choices was not achieved. The Effectively Maintained Inequality hypothesis (Lucas, 2001) explains this phenomenon by arguing that when quantitative advantages no longer apply, students from privileged backgrounds seek qualitative advantages in the form of positional goods (Marginson, 1998).

Inequality is therefore noticeable both in the choice of the institution and in the choice of the study programme. Regarding the choice of institution, whether a university or a polytechnic, the influence of family background comes to the fore in the fact that students from families with higher levels of education tend to prefer universities (Tavares, 2013), as these latter are perceived to be at the top of the most prestigious higher education institutions in Portugal (Tavares & Cardoso, 2013). On the other hand, polytechnic institutions are perceived as less reputed institutions, but contrary to universities, they enrol a more diversified student body, which turns these institutions more equitable than universities and also more representative of the composition of the student population in Portugal. According to recent data of the General Directorate for Education and Science Statistics (DGEEC), it is in universities, public and private, that higher percentages of students whose parents have higher qualification levels can be found (Fig. 8.1).

Similarly, the influence of the family's socioeconomic background is visible in the percentage of scholarship holders in universities, compared to those in polytechnics. Scholarships are attributed to students coming from low-income families. According to the most recent data from the

Fig. 8.1 Percentage of students enrolled in the first year in 2017/2018, by type of institution, whose parents have a higher education qualification. Source: DGEEC

General Directorate for Higher Education for 2018/19, 31.49% of all students enrolled in the first year were granted a scholarship. However, more scholarships were granted proportionally to students enrolled in polytechnic institutions (37.38%), compared to those enrolled in universities (28.14%), which suggests that it may be more difficult for students of lower socioeconomic background to enter universities (Fig. 8.2).

The segregation by socioeconomic background is also evident in the choice of study programme, since highly selective programmes enrol a much higher percentage of students from advantaged backgrounds. For instance, a previous study (Tavares et al., 2008) highlighted the case of Medicine, which enrolled about 75% students from advantaged backgrounds, against 25% of disadvantaged students. In contrast, the percentage of students from disadvantaged backgrounds enrolled in less prestigious programmes, such as Nursing, was about 75% against 25% of students from advantaged backgrounds (Tavares et al., 2008). More recently, data show that 73.2% of medical students (university) have parents with higher education, while 73.0% of students in nursing and health technologies (polytechnic) have parents with qualifications below higher education (DGEEC, 2016). It is in the areas of education and business (Marketing, Accounting, Management, etc.) that we find most students from families with less education: 39% and 20% of students in these areas, respectively,

Fig. 8.2 Percentage of first-year students awarded a scholarship by type of institution, 2019. Source: DGES

are from families with educational levels corresponding to primary education. On the other hand, Law, Fine Arts and Sciences are preferred disciplines for families with a higher educational level. Similar to what happens in the case of institutions, study programmes also differ in the percentage of scholarship holders they enrol. Comparing similar study programmes belonging to the same broad disciplinary areas, some of which are more selective and offered in universities, while others are less selective and taught in polytechnics, the proportions of scholarship holders are illustrative of the inequalities in participation, as indicated by the Effectively Maintained Inequality hypothesis. For instance, the polytechnic programmes of Solicitor studies (50%), Design (44.30%), Pharmacy (44.24%) and Nursing (40.44%) present higher percentages of scholarship holders than the university programmes of Law (28.33%), Design (28.87%), Pharmaceutical Sciences (27.98%) and Medicine (15.11%). Figure 8.3 shows the higher selectivity of university education and particularly of very competitive areas such as Medicine.

In brief, although there are sufficient places for all higher education applicants, many fail to enter higher education, and among those who

Fig. 8.3 Percentage of first-year students awarded a scholarship in similar disciplinary areas, taught in universities and polytechnics, 2019. Source: DGES

enter, many are not placed in their preferred programmes and institutions in a context of intense competition for those degrees, which represent the most wanted positional goods. The fact that Portugal still has a competitive and stratified higher education system justifies analysing in more detail the factors which contributes to the persistence of inequalities.

DATA AND METHODS

The empirical analysis of the present chapter is based on two datasets: one containing data on individual candidates to public higher education and another one containing programme/institution level data.

The individual candidate dataset resulted from the application process and contains information on all individuals that applied for a place in public higher education institutions. For this reason, the data does not allow addressing the possible barriers that prevented other potential candidates from applying, which would certainly provide a clearer picture of inequalities. For each and every candidate, data provide the hierarchy of alternatives he/she applied for, a general classification of the field of study, the corresponding application GPA, gender and the region of origin. This dataset was made available by the Ministry of Science, Technology and Higher Education, for the years from 2012 to 2018. All the candidates of the first phase of the national contest are considered, which corresponds to a working sample of more than 330 thousand individuals.

The programme/institution level dataset has been built based on information provided by DGEEC and refers to 2017/18. The unit of analysis is the pair programme/institution and contains all programme/institutions that could be matched with those present in the individual candidate dataset. For this reason, the data analysed in the chapter leaves out private higher education provision. This dataset combines information on the proportions of candidates to income-based scholarship and scholarship holders, as well as on the enrolled students' parental educational levels (mother and father, separately). Additional information has been taken from the application process dataset, namely the minimum admission GPA and admission exams, for each pair programme/institution.

Based on these two datasets, the empirical strategy is as follows. First, the group of students who are not allocated a place in any programme/

institution are analysed in detail, looking for possible differences due to gender, region of origin and preferred field of study.

Second, possible differences and/or inequalities among the candidates who are offered a place are analysed. As the number of available places in public higher education was close to or higher than the number of candidates who applied through the national contest in the period under analysis, the likelihood of getting a place in higher education was very high, and the issue of access inequality moved from having/not having an opportunity to study in higher education to the type of programmes and institutions to which candidates were allocated. It has been shown in previous studies (such as Tavares, 2013; Tavares & Cardoso, 2013) that students perceive universities as socially more prestigious than polytechnics. Based on this perception, a series of models intending to look at possible inequalities among placed candidates are estimated. In Model (1), the main determinants of a successful application are identified. An application is considered successful if the candidate is placed and even more successful if the candidate is placed in the first best alternative. A logit model on the probability of being placed in the first best alternative is estimated and gender, application GPA and possible differences over time, regions of origin, as well as fields of study are examined. The Model (2) to be estimated is a logit model on the probability of being offered a place in a university institution versus a polytechnic institute.

Third, at the programme/institution level, two models have been estimated, both trying to identify the main characteristics of the programmes that explain the minimum admission GPA. To begin with, a multiple regression model on the minimum GPA for each programme is estimated, using as regressors: proportion of female students, proportion of mothers with higher education qualifications, proportion of fathers with higher education qualifications, proportion of scholarship candidates, proportion of registered students who took the Mathematics A exam, and dummy variables for programmes offered by universities and for each and every field of study. In order to analyse how these effects potentially change the GPA distribution, a quantile regression model, with the same dependent and independent variables, is estimated. In both models, standard errors adjusted for 33 clusters in institutions are computed.

FINDINGS AND DISCUSSION

Who Is Left Out?

Despite massification and the fact that the expansion of the Portuguese system has reached a point in which the number of places in public higher education is close to the number of candidates, a proportion of candidates is still left out of the public system (11.6% in the period from 2012 to 2018, see Table 8.1). Although the number of these candidates is lower than it used to be, its persistence is worrisome. It is therefore relevant to understand whether they have characteristics which signal inequalities in access to higher education.

Among the candidates who are left out (Table 8.1) women represent 58.6%, although they are also the majority of candidates (58.1%). The fact that there are more female than male candidates for higher education can be justified by school performance, which is overall better for females than for males (Sá & Tavares, 2018).

Candidates who were left out of the system had a GPA of 131.6/200, about 13 points below the average performance of all candidates (144.6). Academic achievement, as measured by the GPA, is often considered in the literature as strongly influenced by the socioeconomic background (Aikens & Barbarin, 2008; Brynes & Miller, 2007; Davis-Kean, 2005; Gerdes, 1988; Kitchen, 2015; Sirin, 2005). The socioeconomic status of families has been used as the most consistent predictor of academic achievement, because students from privileged socioeconomic backgrounds seem to have access to higher quality secondary education, tutors, test preparation, or schools—thus better GPA—than students from lower socioeconomic backgrounds. Lower GPA may therefore be indicative of lower socioeconomic status. As MMI has hypothesised, expansion has been, in the Portuguese case, unable to eliminate inequalities because students with higher GPAs, and likely from more advantaged socioeconomic backgrounds are better placed to take advantage of new educational opportunities.

Candidates who prefer programmes in the areas of Social Sciences, Business and Law, have the hardest time getting a place. Although they represent the larger share of applications (32.5%), 47.4% of unsuccessful candidates are found in these areas. These disciplinary areas are popular among candidates because most of them (except for Economics, Management and Finance) do not require the mathematics exam as a

Table 8.1 Descriptive statistics on the main attributes of the non-placed candidates and on the total (pooled) sample

	<i>Total sample</i>	<i>Candidates not placed</i>	<i>Regions</i>	<i>Total sample</i>	<i>Candidates not placed</i>
Female	58.1%	58.6%	Azores	2.0%	0.5%
GPA	144.6	131.6	Aveiro	5.2%	4.7%
Education	2.0%	1.2%	Beja	1.0%	0.5%
Arts & Humanities	12.5%	13.0%	Braga	9.9%	9.2%
Social Sciences, Business & Law	32.5%	47.4%	Bragança	1.0%	0.5%
Maths and Computer Sciences	9.3%	5.7%	Castelo Branco	1.7%	1.0%
Eng., Industry & Manufacturing	18.3%	9.1%	Coimbra	5.3%	4.2%
Agriculture	1.6%	1.3%	Évora	1.6%	1.1%
Health & Social Protection	17.0%	15.7%	Faro	3.2%	2.1%
Medicine	3.9%	5.3%	Guarda	1.2%	0.6%
Nursing	4.5%	3.4%	Leiria	4.7%	2.6%
Pharmacy	2.1%	1.1%	Lisbon	24.5%	33.9%
Services	6.8%	6.6%	Madeira	2.8%	1.9%
			Portalegre	0.8%	0.4%
			Porto	20.0%	26.1%
			Santarém	3.4%	2.1%
			Serúbal	3.8%	3.8%
			Viana do Castelo	2.3%	1.3%
			Vila Real	2.2%	1.7%
			Viseu	3.4%	1.8%
Nr observations	327,061	37,865	Candidates (%)	11.6%	

Note: Two proportions are reported for each variable. The first column refers to the proportion of each group in the total sample, whereas in the second column the proportions computed within the group of non-placed candidates are reported.

compulsory admission criterion, a discipline in which achievement is generally poor, as measured by the OECD's PISA study (PISA, 2015). Medicine is also an area where the unsuccessful candidates are overrepresented in relation to those who have applied (see Table 8.1), but in this case, it is due to the selective and demanding nature of the admission

criteria, which require not only a very high GPA, but also a greater number of exams (Mathematics, Biology and Physics/Chemistry).

In terms of region of origin, candidates from Lisbon and Porto are clearly overrepresented among those not placed in public higher education (see Table 8.1). As these are the two most populated urban areas in Portugal, the demand for places is higher in these regions. In 2015 the ratio of the number of local candidates over the number of available local places was 1.31 in Porto and 0.90 in Lisbon. However, these two main urban areas attract a large number of candidates from other areas, which represent 45% of candidates in Porto and 60% in Lisbon.¹

Inequalities Within the Public Higher Education System

As implied by the EMI, once higher education becomes nearly universal, the socioeconomically advantaged seek for qualitative differences and use their advantages to secure quantitatively similar but qualitatively better education (Lucas, 2001). Inequalities may arise in their placement in the first preference of programme/institution, and in the access to a more selective type of institution or study programme (see Table 8.2).

First Preferences and Type of Institutions

The model on the probability of a candidate being placed in his/her first preference [model (1), Table 8.2] shows that female candidates are less likely to be placed in their first preference. The better the previous performance, as measured by the GPA, the more likely the candidate is placed in the first preference. The lowest probability of being placed in the first preference goes for candidates in Engineering, Industry and Construction, followed by Social Sciences, Business and Law and finally Health Sciences. The probability of getting into the preferred programme/institution is lowest for students living in the Porto region, when compared to any other region. This may be due to the fact that this is one of the regions where not only the ratio of local candidates to places is the highest but also one that attracts more candidates from other regions.

There are also (potential) inequalities regarding the type of institution. From the results of model (2), in Table 8.2, it is possible to claim that women are less likely to attend university than men. Better performing students are more likely to go to university programmes. Differences

¹ Authors' computations based on the dataset used in the paper.

Table 8.2 Marginal effects of the models on the probability of being placed in the first option and on the probability of getting a place at a university

<i>Variables</i>	(1)	(2)
	<i>Pr(first option)</i>	<i>Pr(placed university)</i>
Female	-0.0037* (0.0019)	-0.0044*** (0.0016)
GPA	0.0060*** (4.41e-05)	0.0100*** (0.00003)
Education	0.1232*** (0.0060)	0.3066*** (0.0049)
Arts & Humanities	0.0901*** (0.0033)	0.3337*** (0.0028)
Social Sciences, Business & Law	-0.0087*** (0.0027)	0.2318*** (0.0024)
Sciences, Math & Informatics	0.0063* (0.0037)	0.5504*** (0.0024)
Engineering, Industry & Construction	-0.0312*** (0.0031)	0.3418*** (0.0027)
Agriculture	0.0437*** (0.0074)	0.3702*** (0.0063)
Health & Social Protection	Baseline category	Baseline Category
Services	0.1152*** (0.0040)	0.1304*** (0.0037)
Azores	0.3460*** (0.0053)	0.3161*** (0.0040)
Aveiro	0.0861*** (0.0044)	0.0926*** (0.0037)
Beja	0.2200*** (0.0086)	0.1025*** (0.0075)
Braga	0.0458*** (0.0035)	0.1162*** (0.0030)
Bragança	0.149*** (0.0090)	0.0803*** (0.0076)
Castelo Branco	0.220*** (0.0067)	0.1947*** (0.0054)
Coimbra	0.176*** (0.0043)	0.0992*** (0.0036)
Évora	0.203*** (0.0070)	0.2815*** (0.0050)
Faro	0.2390*** (0.0050)	0.1154*** (0.0043)

(continued)

Table 8.2 (continued)

<i>Variables</i>	(1)	(2)
	<i>Pr(first option)</i>	<i>Pr(placed university)</i>
Guarda	0.1527*** (0.0079)	0.1487*** (0.0065)
Leiria	0.2047*** (0.0044)	-0.0246*** (0.0039)
Lisbon	0.0644*** (0.0028)	0.1656*** (0.0023)
Madeira	0.2263*** (0.0053)	0.2944*** (0.0038)
Portalegre	0.2052*** (0.0093)	0.1298*** (0.0078)
Santarém	0.1751*** (0.0051)	0.0839*** (0.0043)
Setúbal	0.1553*** (0.0050)	0.0568*** (0.0042)
Viana do Castelo	0.1115*** (0.0061)	0.0348* (0.0052)
Vila Real	0.0925*** (0.0063)	0.2051*** (0.0049)
Viseu	0.1664*** (0.0051)	0.0410*** (0.0044)
2013	0.0657*** (0.0034)	0.0306*** (0.0028)
2014	0.0030 (0.0034)	0.01931*** (0.0028)
2015	-0.0381*** (0.0033)	-0.0074*** (0.0027)
2016	-0.0330*** (0.0033)	-0.0161*** (0.0027)
2017	-0.0631*** (0.0033)	-0.0481*** (0.00274)
2018	-0.0023 (0.0033)	-0.0438*** (0.0027)
Log-likelihood	-187961.32	-138683.84

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Column (1) reports the marginal effects of the logit model on the probability of a candidate being allocated to his first option (rather than being allocated to a second-best alternative). Column (2) presents the marginal effects of the logit model on the probability of being placed in a university programme (rather than a polytechnic institute programme). Marginal effects in columns (1) and (2) are computed as derivatives for continuous variables, and as differences in probabilities for dummy variables. In all sets of results, year dummies are included as controls, but estimates are not reported in the table. The baseline category is 2012 for year dummies, and Porto for regional dummies.

across fields of study are evident: candidates to Health areas are less likely to go to university, which may be due to the highly selective nature of the Health programmes offered in the university sector. Medicine is exclusively offered by universities, whereas most of the programmes in Health are only offered in polytechnic institutes or, at least, offered in both sectors. Candidates from Leiria, followed by those from Porto, have the lowest probability of attending a university. It is worth noting that among the regions with the most selective polytechnic institutes (Porto, Lisbon, Coimbra and Leiria), Leiria is the only one where there is no public university alternative. This fact, combined with the apparent spatial immobility of Portuguese candidates (Lourenço et al., 2020) may explain this result. Universities seem therefore to be more selective than polytechnics. Some of the results in Table 8.2 are easier to understand and to quantify by computing the estimated probabilities of each outcome, in several alternative situations (Table 8.3). Gender specific probabilities are presented. It follows that females face slightly lower probabilities of being allocated to a first preference programme/institution. Probabilities are computed for candidates from Porto, Lisbon and Faro: Porto emerges in the marginal effects estimates as the region where the candidates' entrance is the hardest; Lisbon is the country's capital, and the most populated region; and, finally, Faro is an example of a peripheral and low population region.

Candidates from Porto have the lowest probability of being placed in their first alternative. In fact, Porto is one of the regions where the pressure of demand is the highest. In 2017, the number of vacancies per thousand inhabitants aged between 15 and 24 was 39.4 in the metropolitan region of Porto, whereas in the metropolitan region of Lisbon it was about

Table 8.3 Estimated probabilities of being placed in the first option

	<i>Health</i>			<i>Social Sciences, Business and Law</i>			<i>Engineering, Industry and Construction</i>		
	<i>Porto</i>	<i>Lisbon</i>	<i>Faro</i>	<i>Porto</i>	<i>Lisbon</i>	<i>Faro</i>	<i>Porto</i>	<i>Lisbon</i>	<i>Faro</i>
Male	38.3%	45.0%	64.0%	37.4%	44.1%	63.1%	35.1%	41.7%	60.8%
Female	37.9%	44.6%	63.6%	37.0%	43.7%	62.7%	34.8%	41.3%	60.4%

Note: Probabilities estimated for year 2015 and candidates who have a GPA equal to the sample mean.

47.² This implies that a student from Porto is more likely to have to move away from home to get a place in public higher education and, consequently, higher education is more expensive for these students. The analogous probabilities for Lisbon candidates are bigger, and much bigger for those coming from Faro. Such pattern is found in the three disciplinary areas used as examples, although differences in magnitude apply. Namely, the probabilities of first preference placement are lower in Engineering, Industry and Construction.

Selectivity of Study Programmes

Table 8.4 contains the estimation results of the models that aim at identifying variables that could potentially influence the minimum GPA for admission into a specific programme/institution. Model (1) reports the results of the multiple linear regression model, that is, it shows the average effect of each explanatory variable on the minimum GPA. The minimum GPA to be admitted to a programme is higher when the proportions of female students, of students who took the Mathematics A exam, and of students whose parents (mother and father) hold a higher education degree are higher. The effect of the mother's tertiary education attainment appears stronger than the one of the father's. This suggests that parental education attainment makes a difference regarding the candidates' success as measured by the required admission GPA, which is possibly due to the fact that better educated parents are more likely to provide the right incentives to study, as well as better access to educational resources. In Portugal, tertiary attainment has also been associated with higher income (Almeida et al., 2017), which suggests that a favourable financial situation, usually very much related to the educational background of the parents, positively influences candidates' success.

The effect of the disciplinary area on the minimum GPA was also tested. Programmes in Social Sciences, Business & Law have, on average, a higher minimum admission GPA than programmes in Health and Social Protection. For the other disciplinary areas (except Humanities, where differences were not statistically different), the minimum GPA is on average lower than in Health and Social Protection programmes. These two (Health and Social Protection and Social Sciences, Business and Law) are the most selective disciplinary areas in Portugal.

²Demand pressure in Porto and Lisbon has been computed as the ratio of vacancies offered in the district and the population (in thousands) in the metropolitan region.

Table 8.4 Minimum admission GPA estimation results

<i>Variables</i>	(1)	(2)			
	<i>MinGPA</i>	<i>Quantile regression</i>			
		<i>q25</i>	<i>q50</i>	<i>q75</i>	<i>q95</i>
Female	17.735*** (2.536)	11.917*** (3.206)	15.654*** (3.944)	21.561*** (4.179)	27.245*** (3.319)
Proportion of fathers with HE	24.372*** (6.530)	7.634 (13.319)	32.666** (13.791)	28.855** (12.664)	41.273*** (10.045)
Proportion of mothers with HE	42.901*** (5.898)	49.700*** (13.163)	41.902*** (12.064)	42.438*** (9.767)	35.692*** (6.126)
University programme	5.536*** (1.136)	5.739*** (2.043)	5.798*** (1.726)	7.592*** (1.442)	5.327*** (1.909)
Maths A Exam	8.548*** (1.859)	10.980*** (4.014)	6.448*** (2.416)	6.055 (3.832)	11.194*** (3.358)
Education	-8.495*** (3.090)	-3.655 (3.963)	-9.531*** (1.847)	-15.025*** (4.737)	-9.718* (5.732)
Arts & Humanities	-0.688 (1.964)	0.613 (2.995)	-0.721 (2.907)	-0.447 (2.705)	3.206 (2.699)
Social Sciences, Business & Law	5.002*** (1.707)	5.542** (2.607)	3.846** (1.956)	3.906 (3.172)	7.974*** (1.532)
Sciences, Math & informatics	-6.110*** (2.251)	-6.909 (4.724)	-6.819** (2.993)	-4.567 (3.287)	-3.654 (4.446)
Engineering, Industry & Construction	-4.791** (2.246)	-8.747* (4.498)	-6.090* (3.264)	-0.772 (4.153)	2.228 (3.140)
Agriculture	-9.322*** (3.203)	-9.113 (6.039)	-9.557** (4.777)	-8.199 (5.113)	-6.108** (2.477)
Services	-4.454** (2.240)	-5.778* (3.427)	-3.294 (3.098)	-3.743 (3.617)	-0.336 (4.790)
Constant	-6.581 (14.897)	8.323* (4.259)	-10.433*** (2.146)	-19.093*** (3.007)	-30.363*** (2.965)
Observations	978	978			
R-squared/Pseudo R-squared	0.447	0.181	0.259	0.329	0.391

Notes: Standard errors adjusted for 33 clusters in HEIs in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
The explained variable is the minimum GPA for admission in a given programme/institution

Model (2) of Table 8.4 shows the results of the quantile regression model, looking at the distribution of the minimum GPA for admission. Study programmes were organised in ascending order of the minimum GPA. The following percentiles were chosen: q25, q50, q75 and q95, where q25 represents the 25% of programmes with lowest admission GPA (less selective programmes) and q95 represents the top 5% of programmes with the highest admission GPA (the most selective programmes—the minimum GPA was 166 out of 200). The results seem to confirm the ones of Model (1): the higher the percentage of female students in a programme, the higher the minimum admission GPA. This effect is stronger in the study programmes which require higher admission GPA (q95) than in study programmes with lower admission GPA (q25). Although the proportion of mothers with higher education attainment has again been confirmed to be related to higher admission GPA, this effect gets weaker as the selectivity of the programmes increases. In this case, the effect of fathers' tertiary attainment gets stronger than that of mothers' as study programmes become more selective. Therefore, in the case of the most selective programmes, the effect of fathers' higher education qualifications is stronger than that of mothers.

The proportion of students who took the Mathematics A exam is associated with higher minimum GPA and this effect is stronger in the most selective courses. This model (2) confirms the results of model (1) regarding the different disciplinary areas. It adds, however a further piece of information: the difference in the minimum GPA between Social Sciences, Business & Law and Health and Social Protection programmes gets stronger in the most selective courses compared to the less selective ones.

Parental education appears to be very relevant to the access to the top ranked programmes as measured by the minimum access GPA. The proportion of fathers/mothers with higher education diplomas has often been seen as a very good indicator of the socioeconomic background of the students. The same models have been estimated using the proportion of scholarship applicants by programme, rather than parental education variables, as a robustness check. The sign and the significance of the estimated coefficients are in line with those reported in Table 8.5 (see Appendix). Less selective programmes tend to show the highest shares of scholarship applicants, giving strength to the conclusion that socioeconomic background is a key factor in access to the best higher education programmes. This means that inequalities persist even among those who apply and get a place in higher education.

Table 8.5 Minimum admission GPA estimation results (alternative specification)

<i>Variables</i>	(1)	(2)			
	<i>Min GPA</i>	<i>Quantile regression</i>			
		<i>q25</i>	<i>q50</i>	<i>q75</i>	<i>q95</i>
Female	20.356*** (2.978)	12.925*** (4.841)	16.892*** (6.357)	28.451*** (7.282)	33.174*** (5.836)
Proportion of scholarship applicants	-19.898*** (3.360)	-10.509* (5.624)	-14.835** (6.858)	-25.160*** (5.937)	-32.371*** (4.412)
University programme	12.467*** (1.204)	10.864*** (2.042)	13.247*** (1.555)	14.121*** (1.647)	10.531*** (2.210)
Maths A Exam	17.567*** (2.054)	17.814*** (4.463)	19.388*** (3.258)	18.486*** (3.408)	19.693*** (3.630)
Education	-12.825*** (3.526)	-6.961** (3.350)	-12.511** (4.876)	-20.600*** (4.469)	-17.547*** (5.466)
Arts & Humanities	0.750 (2.237)	0.792 (2.203)	-0.021 (2.793)	0.364 (4.101)	7.477** (3.359)
Social Sciences, Business & Law	4.445** (1.934)	4.274 (2.882)	4.811* (2.825)	2.100 (3.664)	6.061** (2.547)
Sciences, Math & informatics	-7.873*** (2.555)	-7.058** (3.229)	-9.862** (4.005)	-9.999** (4.724)	-4.629* (2.374)
Engineering, Industry & Construction	-4.395* (2.571)	-7.829* (4.022)	-10.120** (4.550)	-3.923 (6.343)	5.823* (3.435)
Agriculture	-7.989** (3.617)	-11.801*** (4.466)	-11.338* (5.976)	-4.179 (9.348)	0.917 (3.414)
Services	-2.156 (2.550)	-2.005 (3.619)	-1.687 (4.570)	-3.430 (5.212)	-1.206 (4.650)
Constant	3.155 (16.843)	18.979*** (2.671)	3.619 (3.839)	-13.005*** (4.248)	-21.022*** (2.849)
Observations	963	963			
R-squared/Pseudo R-squared	0.293	0.181	0.259	0.329	0.391

Notes: Standard errors adjusted for 33 clusters in HEIs in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The explained variable is the minimum GPA for admission in a given programme/institution. Information on scholarship applications is not available for all programmes

CONCLUSIONS

This chapter has analysed inequalities in access to higher education and to the more selective institutions and programmes. Despite the high number of places available in public universities and polytechnics (close to the total number of candidates), there are still students who are left out. Having lower GPA, applying to Social Sciences, Business and Law and to Medicine, as well as being from Lisbon and Porto seems to weigh negatively in access to higher education, determining unsuccessful applications. As the GPA (Sá & Tavares, 2018) is affected by the socioeconomic status (Aikens & Barbarin, 2008; Brynes & Miller, 2007; Davis-Kean, 2005; Gerdes, 1988; Kitchen, 2015), it is arguable that a lower GPA is associated with lower socioeconomic backgrounds. Therefore, socioeconomic status may be playing a significant role in the persistence of access inequalities. Results also indicate that some disciplinary areas are more selective than others and that there are differences between regions of the country, as getting a place in Porto, for instance, is harder than it is in other regions.

These inequalities are also embedded within the higher education system. Indeed, findings indicate that public universities are more selective than polytechnics and that Social Sciences, Business and Law, followed by Health programmes, are more selective than the other disciplinary areas. In order to secure a place in universities and in these programmes, which are perceived as providing better educational outcomes (Sá & Tavares, 2018; Tavares, 2013), candidates need to be in an advantage position. Being male, having a high GPA or belonging to a region of Portugal where the number of candidates is lower than the number of places increases the likelihood of being placed in the most wanted institutions and study programmes.

The argument that higher GPA is associated with a higher socioeconomic status is partly confirmed by the results obtained when the unit of analysis was the programme/institution. In fact, a higher proportion of students whose parents hold higher education qualifications increases the minimum GPA of a study programme. Both fathers' and mothers' tertiary attainment has a positive effect on the minimum GPA. However, in the most selective programmes with the highest GPA, it is the fathers' tertiary attainment that has more weight. It seems, therefore, as hypothesised by the MMI and EMI theories, that students with lower GPA, with a lower social status, will only get a place in the more selective programmes or institutions when the needs of the socially advantaged students are fully

satisfied, or when these latter have secured for themselves both quantitatively and qualitatively better outcomes (Lucas, 2001).

The study has some limitations because it does not cover the group of students who did not apply to higher education, which is an important group to explore inequalities. Despite this, the study contributes to the literature on equity in access to higher education, highlighting variables which determine both success in entering higher education and success in getting a place of preference. It also provides relevant information for future policies aimed at diminishing inequalities. For instance, it is necessary to take measures aimed at widening the recruitment base of higher education institutions by diversifying admission routes in order to encourage students who rarely apply to do so (mostly those from professional secondary tracks, which correspond to approximately 40% of the total number of secondary-school students). Additionally, tailored pedagogical support to improve the academic performance of the groups who encounter more obstacles to enter higher education might be considered. Finally, since the demand pressure for higher education places in Lisbon and Porto is among the highest, the recent Portuguese Ministry's measure which reduced the available places these urban areas in order to encourage higher education students' geographic mobility from the big cities to more peripheral regions should be carefully assessed because it might have significant effects on access inequalities.

APPENDIX

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