Does It Matter Which Top Institution You Choose? A Case Study of Brazilian Graduate Admissions*

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Abstract

Does attending a particular graduate school matter for academic outcomes once we account for students' selection into graduate programs? This paper sheds light on this previously unexploited question by investigating the impact of attending a selective master's institution in Economics on Ph.D. placement. Using data from the ANPEC exam, widely used for admission to Brazilian master's programs in Economics, we can control for relevant variables, such as applicants' colleges and ANPEC scores. To address the potential selection biases, we compare only students who applied and were accepted to the top four master's programs, as in Dale and Krueger (2002). When we account for students' observable and unobservable characteristics, we show that seemingly large differences between programs nearly vanish, and top master's programs perform similarly in Ph.D. placements abroad.

Keywords: selective universities, graduate school, Ph.D. enrollments, higher education, returns to education.
JEL Classification Codes: I23, I26.

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1 Introduction

There is fierce competition among top universities to attract high-achieving students in many educational settings. As education markets become more nationally integrated, colleges seek to differentiate themselves from their competitors to influence students' choices (Hoxby, 1997). In doing so, institutions may build a reputation based on their students' future outcomes and attract individuals inclined to fulfill those expectations. Therefore, an important question is whether the payoffs of a given educational choice are due to the school or individuals' preexisting observable and unobservable characteristics.

At the college level, there is quite some evidence that the positive impact of selective versus non-selective schools on students' labor market outcomes is severely reduced or even eliminated once we account for students' self-selection into institutions (e.g., Dale and Krueger, 2002; Mountjoy and Hickman, 2021). However, we know much less about the relative contribution of graduate schools, a level at which most relevant players are selective universities, and their graduates' academic rather than labor market outcomes may be better metrics of a school's performance.

This paper aims to fill this gap by investigating whether attending a particular top master's program impacts students' subsequent Ph.D. enrollment abroad. We use data from the National Association of Postgraduate Programs in Economics (ANPEC) exam, widely used for admission by Brazilian master's programs. Master's programs are the most common pathway for Brazilian students to Ph.D. programs in Brazil and abroad. By linking the ANPEC dataset to Ph.D. enrollment data obtained from various sources, we show that 48.4% of our sample pursued a Ph.D. in Brazil or abroad after completing their master's degree.[1] Overall, only 13.8% enrolled in a Ph.D. program abroad. Still, this proportion is substantially larger, ranging from 20.0% to 40.0%, for the top four institutions, namely FGV-EESP, FGV-EPGE, IPE-USP, and PUC-Rio. Moreover, these four schools account for 77.0% of Ph.D. placements abroad, confirming that they are the relevant setting for investigating this research question.

In principle, master's programs may impact Ph.D. enrollment through several channels. For instance, their professors may incentivize their students to apply for Ph.D. programs abroad directly or indirectly through role models. Some programs may also have better technology for assisting their graduates in obtaining admission to Ph.D. programs by helping them apply to programs that better match their profiles and writing more convincing reference letters. While we cannot disentangle these different mechanisms in our analysis, our results provide the combined (relative) impact of all those potential influences on Ph.D. enrollment abroad for our top four programs.

[1] As we explain in more detail in Section 3, our initial sample contains students ranked up to the 250th position on the ANPEC exam who enrolled in a master's program between 2004 and 2017.

We benefit from an unusually favorable setting to separate the impact of graduate schools from students' sorting into institutions. Postgraduate admission to Economics programs in Brazil mainly relies on ANPEC scores rankings.[2] Thus, we observe in our data nearly the entire set of applicants' information relevant for admission in contrast with most settings that adopt more decentralized and holistic admission procedures.

Importantly, we observe applicants' undergraduate degree institutions and a measure of pre-graduate school performance in Economics, the ANPEC exam scores, allowing us to overcome one of the main challenges in the measurement of value-added in the higher education literature (Cunha and Miller, 2014). As expected, both variables reveal to be crucial controls in our empirical specifications.

Moreover, applicants must list up to six (unordered) choices of master's programs upon registering for the ANPEC exam. We can therefore limit our analysis to applicants who applied and were admitted by the top four programs, allowing us to minimize concerns related to unobservables as suggested by Dale and Krueger (2002).[3] Finally, our top four programs clearly distinguish themselves from the remaining master's programs in attracting the best-ranked ANPEC applicants and placing students in Ph.D. programs abroad. Still, we can exploit a significant degree of variation within and among these top four programs regarding their incoming students' profiles and Ph.D. placement over the years.

Since we compare the top four master's programs, our sample includes all ANPEC applicants enrolled in one of these programs. For this sample, we start by showing that FGV-EPGE and PUC-Rio appear significantly more successful than FGV-EESP in terms of Ph.D. placement abroad, especially in top-ranked programs. When we include controls for college fixed effects, the effects correspond to increases of 43.1% and 70.1% in the probability of attending a Ph.D. program abroad for FGV-EPGE and PUC-Rio students relative to FGV-EESP's, respectively. Furthermore, when we restrict our outcome variable to the top eight Ph.D. programs abroad, that relative advantage corresponds to an even larger increase of 108.2% and 151.8%, respectively.[4]

Importantly, these differences nearly vanish once we account for students' observable and unobservable characteristics. More precisely, when we control for students' ANPEC scores, the impacts of FGV-EPGE and PUC-Rio relative to FGV-EESP on the likelihood of pursuing a Ph.D. abroad are close to zero and become statistically insignificant. Moreover, all coefficients become statistically in-

[2] Some programs may require letters of recommendation and undergraduate transcripts but still place a relatively larger weight on the ANPEC exam, especially for top-ranked applicants.

[3] Unfortunately, a regression discontinuity design is unfeasible in our setting. Indeed, we cannot identify clear-cut cutoffs among these four programs both because their admission lists overlap considerably but also due to data limitations (see Section 3).

[4] The top eight Ph.D. programs abroad are MIT, Harvard, Stanford, Chicago, Princeton, Yale, Berkeley, and Northwestern. We explain in Section 3 how we select this group of programs.

significant when restricting our analysis to students who selected and received offers from the four top institutions.

Our study relates to the literature that aims to identify the impact of selective colleges on students' labor market outcomes.[5] The seminal contribution is Dale and Krueger (2002), which propose restricting the analysis to students who had similar application and admission profiles to deal with the selection of students into colleges based on unobservables. Using data from the College and Beyond data set and the National Longitudinal Survey of the High School Class of 1972, they show no distinguishable differences between the earnings of students who attended more or less selective colleges once they take selection into account, except for minority students.

Similarly, Cunha and Miller (2014) show large earnings differences across colleges in Texas that significantly reduce once they control for selection using a similar strategy. More recently, Mountjoy and Hickman (2021) expanded Dale and Krueger (2002)'s methodology to allow for heterogeneous treatment effects and confirm that the value-added of postsecondary institutions is small relative to the effects of students' sorting. Interestingly, they show a short-term selectivity premium that fades away after a few years into the job market. This last finding helps reconcile the results from Broecke (2012) that finds a positive wage premium to attending selective universities in the UK around four years after individuals graduate, even accounting for selection on observables and unobservables.

We also contribute to the tiny literature on the determinants of Ph.D. enrollment. A few studies link enrollment in graduate programs with college quality and labor market conditions. Eide et al. (1998) find that the quality of college significantly increases the probability of attending graduate school at a major research institution. Bedard and Herman (2008) conclude that labor market conditions do not affect graduate school enrollment while Johnson (2013) shows that enrollments respond to unemployment only for women.

Overall, our findings show that differences in Ph.D. placements abroad among Brazilian top master's programs are mostly due to the (self-) selection of students both in terms of observable and unobservable characteristics. Once we account for their ANPEC scores and compare students with the same choices/options, most master's programs are similar in their placement profiles. While our results do not speak directly to the determinants of Ph.D. enrollment, they suggest that individuals' characteristics play a major role in explaining graduate school continuation.

[5] A related literature investigates the impact of college attributes, the so-called school quality, on students' future earnings (e.g., Fox, 1993; Loury and Garman, 1995; Daniel et al., 1997; Brewer et al., 1999; Behrman et al., 1996; Altonji and Dunn, 1996; Black and Smith, 2004). Overall, these papers suggest that college quality positively affects students' labor market performance. Still, such effects tend to be overestimated in studies not accounting for the self-selection of students into colleges.

This paper is organized as follows. Section 2 presents the ANPEC exam characteristics. Section 3 describes the data and Section 4 reports the empirical strategy. Section 5 presents the main results and some robustness checks. Finally, Section 6 concludes.

2 Background

In Brazil, undergraduate degrees in Economics last for four or five years depending on the university and stream (typically daytime and evening). While some Ph.D. programs in Brazil admit few students straight after their undergraduate studies, most students start their postgraduate studies with a master's degree. Moreover, Brazilian master's programs, especially at top institutions, are sought-after by students wishing to pursue Ph.D. programs abroad.

The ANPEC exam is the centralized postgraduate admission exam in Economics organized by the Brazilian National Association of Postgraduate Programs in Economics (ANPEC, *Associação Nacional dos Centros de Pós-Graduação em Economia* in Portuguese). Brazilian master's and (some) Ph.D. programs adopt the ANPEC exam for admission, combined with other criteria or not. The exam takes place annually and does not require any specific academic degree, although only college graduates can enroll in masters' or Ph.D. programs in Brazil. Applicants register for the ANPEC exam by simply filling out a form with personal data, paying a fee, and selecting a list of (up to six) unordered master's program choices.[6]

The ANPEC exam evaluates students on six different undergraduate subjects: Microeconomics, Macroeconomics, Mathematics, Statistics, Brazilian Economy, and English. The exam is the same for all applicants, and it consists of true or false and open-ended questions. ANPEC calculates each subject's final score considering that an item answered incorrectly cancels the score obtained in an item responded correctly in the true or false questions and then standardizes each subject-specific score at the year level. Based on the exam scores, ANPEC provides two general rankings, with and without the Brazilian Economy score, and then specific rankings based on each postgraduate institution's weighting criteria. The ANPEC general rankings equally weight all tests except English (and Brazilian Economy, if applicable). According to its pre-established rules, each program uses the general or specific ranking to fill its vacancies. In most years of our sample, top programs use the ANPEC ranking without the Brazilian Economy score, i.e., the ranking that uses the arithmetic average of the Microeconomics,

[6] On the ANPEC subscription, the students list their preferred master's programs. We expect these choices to be informative, as applicants can only choose six programs. Indeed, about 90.0% of individuals in our final sample attended a program they listed in the ANPEC subscription. If we consider only the top four institutions' enrollees, that number increases to 98.1% of the applicants in the sample.

Macroeconomics, Mathematics, and Statistics tests. Therefore, we use the ANPEC ranking without the Brazilian Economy score throughout our paper (henceforth, ANPEC ranking). Accordingly, our ANPEC score equally weights the Microeconomics, Macroeconomics, Mathematics, and Statistics standardized scores.

Each institution sends admission offers to the best-ranked applicants and, in some cases, invites them to campus visits. Importantly, institutions compete for the better-ranked students and may send offers even to students who did not list that institution in their preference lists. Therefore, depending on the applicant's ranking position, she may have a set of institutions from which to select. In summary, applicants make two significant decisions. First, the applicant chooses the set of institutions they will apply to. Second, after the ANPEC exam result, the student decides which institution she will attend among the institutions that accepted them, i.e., among the admission offers she received.[7] Higher reputation programs typically attract the best-ranked applicants. However, students also sort based on location and different profiles of master's programs.

The academic year starts in February/March for students who enroll in master's programs. Since master's programs last for two years, students typically apply for Ph.D. programs abroad by the end of their second year (in October/November) to start in September/October of the following year. However, some students may postpone their application to the following year. Thus, our last cohort started the master's program in 2017 and typically applied for the Ph.D. in 2018 and 2019, beginning in the following year. We focus on Ph.D. programs abroad since admission to Ph.D. programs in Brazil is less competitive, especially for students with a master's degree from top institutions. In our sample, 76.5% of students from the top four institutions who pursued a Ph.D. in Brazil remained in the same university.

Apart from showing effects on Ph.D. programs abroad, we also investigate admission to particularly reputable programs. There are two rankings available for Ph.D. programs abroad, as shown in Table A.1. Amir and Knauff (2008) ranks programs based on their job market placements, considering the faculty employed in 58 universities in 2006. We use their R3 score, which restricts hires to 1990-2006, to obtain a recent picture of Ph.D. programs' performance. US News (2022) also provides a ranking specific to Ph.D. programs in Economics, including only U.S. universities. Notably, both rankings place the same Ph.D. programs in the first eight positions. We denote this group, including MIT, Harvard, Stanford, Chicago, Princeton, Yale, Berkeley, and Northwestern, as the 'top eight' group.[8]

[7] Institutions do not necessarily fill all vacancies simultaneously. Some programs do a second round to fill the remaining vacancies after the first round.

[8] QS (2022), Times Higher Education (2022), and Shanghai Ranking (2021) provide global rankings focused on Economics but not exclusively based on graduate programs, being therefore unfit for our purposes.

3 Data

Data and Sample Restrictions

Our main database comes from ANPEC. We use data on applicants' performance in the ANPEC annual exam from 2004 until 2017. The dataset includes applicants' positions according to ANPEC and each program's ranking criteria and their exam standardized scores by subject. In addition, the data also hold individual background information like gender, race, age, marital status, nationality, undergraduate degree and school, and self-reported information on how many times the individual took the ANPEC exam before and in which year the applicant finished her undergraduate studies. Importantly, the data include each applicant's (up to) six unordered choices of graduate programs.

Since our analysis focuses on the most selective programs, we keep only the ANPEC applicants who ranked in the first 250 positions of each exam year, representing 21.4% of the total observations. In addition, when the applicant took the exam more than once, we consider only the most recent application (16.0% of observations in our sample refer to applicants that take the exam more than once). After making those restrictions, we have 2,981 observations.

From 2009 on, the ANPEC datasets show the M.A. program the applicant eventually enrolled in, but that information is not available between 2004 and 2008. To obtain the 2004-2008 master's enrollment data, we link the ANPEC exam records to two datasets from *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (CAPES).[9] First, we use publicly available data on all enrollments in Brazilian graduate programs available for 2004-2019. We merge the CAPES and ANPEC datasets using graduate students' full names and ANPEC application years, allowing us to identify the applicant's enrollment institution for 76.8% of our 2004-2008 sample.

For the unmatched ANPEC applicants, we also use the 2001-2020 Brazilian public catalog of the postgraduate thesis, the Sucupira dataset, to identify where the student completed the master's program using the applicant's full name.[10] By including the Sucupira's database, we additionally obtain the master's degree institution for 2.3% of the 2004-2008 ANPEC cohorts.

We then searched online for the master's program attendance for those we did not find in the CAPES and Sucupira databases, which correspond to 21.0% of the 2004-2008 sample. Since Brazilian master's programs last for two years, these cases typically correspond to students who took the ANPEC exam but

[9] The Coordination for the Improvement of Higher Education Personnel, in English, is the Brazilian federal government agency under the Ministry of Education that oversees all postgraduate institutions and centralizes information on all M.A. and Ph.D. programs in Brazil.

[10] CAPES maintains the Sucupira's thesis catalog, which can be accessed in CAPES (2019). All individuals who obtained a master's or Ph.D. in Brazil between 2001 and 2020 are in the Sucupira database. The dataset includes the thesis title, the student's full name, the year of the thesis defense, and the master's degree program.

decided not to pursue an M.A. or a Ph.D. We find a master's degree program for 14.8% of the 2004-2008 sample in the Lattes Curriculum[11] and LinkedIn profiles through this online search. Combining all these data sources allows us to find information for 93.8% of the 2004-2008 initial sample.

We drop ANPEC applicants without a master's enrollment (18.3% of the initial sample) and those enrolled in a Ph.D. without completing the master's program (1.0% of the initial sample). After removing three observations with missing data on the undergraduate degree, our working sample contains 2,403 individuals with master's degree enrollment.

For these ANPEC applicants with master's enrollment, we then collect additional data on their subsequent Ph.D. placement. We merge the CAPES and Sucupira's datasets to ANPEC datasets using graduate students' full names to identify those who did a Ph.D. in Brazil in any field of study after ANPEC application year, i.e., 2004-2017. The CAPES dataset contains the universe of individuals enrolled in a Ph.D. program in Brazil. We find information for 33.2% of our working sample. We search for a Ph.D. placement abroad after master's degree enrollment for the remaining applicants. For applicants who attended the master's program at FGV-EESP and PUC-Rio, we use the public lists containing all Ph.D. placements available on these institutions' websites.[12] For applicants who attended the master's program at FGV-EPGE and IPE-USP, we use placement lists provided by these programs' coordinators. We obtain data on Ph.D. abroad for 8.2% of our working sample. For applicants who attended other master's institutions, we consult their Lattes Curriculum, LinkedIn, and personal websites. Combining these sources of information, we obtain data on Ph.D. placement for 55.1% of our working sample.

Finally, we restrict our sample to ANPEC applicants who attended one of the top four programs. Our final sample contains 908 individuals.

Master's Admission Offers

Our data allow us to observe the master's program the applicant eventually attended, but not the offers she received, i.e., the programs where she could have enrolled. Identifying the applicants' admission offers is essential to implementing the method proposed by Dale and Krueger (2002). We implement a simple method to infer applicants' admission offers. In a nutshell, if the student was the lowest-ranked enrolled in a program, in the respective ranking, we consider that all better-ranked applicants received offers from that same institution.

[11] The Lattes Curriculum is the national register of the academic activity of students and researchers in Brazil maintained by CNPq, *Conselho Nacional de Desenvolvimento Cientfico e Tecnolgico*, in Portuguese (CNPq, 2019).

[12] These placement lists are available at https://economics-sp.fgv.br/graduate-program/placement/master-students and http://www.econ.puc-rio.br/uploads/alunos_doutorado_exterior.pdf.

We illustrate how we infer admission to programs other than the one the applicant attended in Table 1. Suppose that the last student that enrolled in program A was the student ranked 56.[13] We assume that all individuals ranked between 1 and 55 received an admission offer from institution A. We also assume that institution A did not admit any students below 56. Using this method, we construct a dummy variable equal to 1 if the applicant was admitted to institution 1 and 0 otherwise.

Table 1: Illustration of Admission Inference Method

Ranking in institution A	Attendance	Admitted to institution A
55	institution B	1
56	institution A	1
57	institution B	0
58	institution C	0
59	institution B	0

We also discard outlier applicants who attended a master's program but were more than 15 places away from the nearest above-ranked admittee and the applicants below this outlier.[14] Outliers correspond to 0.4% applicants in our sample. Our method fails if the lowest-ranked student enrolled in a given program is not necessarily the last to be accepted by that institution. Indeed, if an applicant ranked below the last enrolled did not attend a program, we do not know if she was not admitted or opted for another program.

To check the effectiveness of our admission inference method, we compare our inference with the actual offers for some programs. Following our request, FGV-EESP and IPE-USP provided us with their offers list for some years. The information allows us to compare the last positions of the admitted applicants with the last position according to our method. We can verify that, for FGV-EESP, the actual ranking position of the last admitted student was close to our inferred classification. For 2015 and 2016, we failed to detect seven and three students who received admission offers, respectively. For 2017, the estimated ranking of the last student who received an offer matches exactly the actual one. The inference for the last students accepted in IPE-USP was also close enough: two students in 2013, five in 2014, and eight in 2015 students were considered not accepted by IPE-USP in our method when, in fact, they received admission offers. Thus, while we fail to account for some students below the last enrolled in a

[13] As explained in Section 2, each institution uses either one of the ANPEC general rankings or their ranking. In our database, UERJ, UFJF, UFRGS, UFSCAR, UFU, ESALQ, UNICAMP, and UEM did not present their ranking in at least one ANPEC exam edition. To reconstruct their rankings, we consult the ANPEC exam regulation available at http://www.anpec.org.br/novosite/br/exame.

[14] These outliers exist because some programs select applicants considering letters of recommendation, transcripts, or research experience in addition to the ANPEC score. In that case, the admitted student would be in a ranking position far from most students approved through the ANPEC exam.

program, our admission inference method reasonably estimates the actual admission offers.[15]

Another concern is that institutions are not bound to follow the ranking strictly. Instead, they may select some relatively worse-ranked individuals or not admit some better-ranked applicants. By excluding the outliers, we can deal with the former. However, the second issue is more complicated and may introduce some biases in our estimation. Since cherry-picking is unlikely for top-ranked applicants, we run our regressions considering only the individuals ranked in the 25 first position of the ANPEC ranking. We reach similar conclusions with this reduced sample.

Descriptive Statistics

Our initial sample considers the 250 top-ranked applicants in the ANPEC exam. During the 2004-2017 period, these individuals enrolled in 33 different master's programs. Table 2 displays summary statistics for this sample, including ANPEC ranking information of enrollees and Ph.D. placement by master's program. Four institutions stand out both because they enroll students near the top of the ANPEC ranking and place many of them in Ph.D. programs abroad.[16] These institutions are PUC-Rio, FGV-EPGE, IPE-USP, and FGV-EESP, henceforth denoted 'top four' master's programs. The top four programs admit students with the best placements in the ANPEC ranking, mostly in the first 15 and 30 positions. These institutions also manage to place a sizable proportion of their students in prestigious Ph.D. programs abroad. By contrast, non-top four programs admit relatively worst-ranked students and a smaller proportion of students in the 30 first ANPEC ranking positions than top four programs. Importantly, they place a significantly lower proportion of their master's students in Ph.D. programs abroad.

Table 2 shows that the top four programs enroll students at the top of the ANPEC ranking, with the median ANPEC ranking ranging from 18 at PUC-Rio to 70 at FGV-EESP. Undoubtedly, PUC-Rio is the most selective program in terms of admission. Forty-two and seventy-nine percent of their enrollees were in the first 15 and 30 positions of the ANPEC ranking, respectively. The four programs place more than half of their students in Ph.D. programs in Brazil and abroad. Notably, they also place many students in Ph.D. programs abroad. When considering Ph.D. programs abroad, we see a more significant proportion of students from PUC-Rio (40%) and FGV-EPGE (34%) who enroll in a Ph.D. abroad, as

[15] Note that since our method focuses on applicants who applied and were admitted by the top four programs, such imprecisions possibly have a reduced impact on our results. Moreover, they would not affect our analysis of the applicants ranked in the 25 first positions, as all top programs typically admit those students. However, identifying the marginal admittee would be crucial in an RDD strategy and, therefore, unfeasible in our study.

[16] These are also the only four institutions that received the maximum score of 7 in the evaluation of Brazilian graduate programs conducted by CAPES.

compared to FGV-EESP and IPE-USP (20%).

The differences between PUC-Rio and FGV-EPGE institutions' Ph.D. placements with FGV-EESP and IPE-USP strengthen when considering higher-reputation Ph.D. programs. PUC-Rio stands out with 16% of M.A. students placed in the top eight Ph.D. programs in any field. If we only consider the Ph.D. programs in Economics, PUC-Rio and FGV-EPGE still have a large advantage: 14% and 12% enroll in the top eight programs, respectively. At FGV-EESP and IPE-USP, only 5% and 1% of graduates enroll in the top eight Ph.D. programs in Economics, respectively. Since PUC-Rio and FGV-EPGE admit students with the best ANPEC ratings, we cannot attribute these differences between the Ph.D. placement of students to a program effect. Our analysis tries precisely to deal with the selection problem in the admission process to measure the institution's impact on Ph.D. placements.

Table 3 presents detailed descriptive statistics for the top four programs. Most applicants are men, white, and single. At the time of the exam, their mean age is 23 years. Most applicants take the ANPEC exam one year after their undergraduate studies.

Comparing the sample of students admitted in one of the top four and students who enrolled in one of them, we see that the enrolled students have slightly higher ANPEC scores. Moreover, the ANPEC scores are even higher in the matched sample. While admittees' demographic characteristics are similar across the four programs, there are some differences in the programs' catchment areas. All top four institutions admit many students with an undergraduate degree from the same city, ranging from 45% at PUC-Rio to 67% at FGV-EESP. However, there are sharp differences in the proportion of these students who graduated from the same institution, possibly reflecting variations in undergraduate program size. For example, while only 13% of students admitted to FGV-EESP were graduates from the same institution, this number rises to 49% in the case of IPE-USP.

Figure 1 presents the box plot of the ANPEC rankings of each of the top four institutions by year.[17] We see that PUC-Rio admitted more top-ranked students in most years of the sample, consistent with the results presented in Table 2. Figure 1 also allows us to analyze changes in the admission pattern over time. Until 2012, FGV-EESP was the institution that admitted the students in the lowest ANPEC ranking positions. However, this pattern changed drastically from 2013 onwards, as FGV-EESP became more selective in the admission of students and attracted more highly ranked students than IPE-USP.

[17] As explained before, we consider the ANPEC ranking the general ranking that equally weights the subjects of Microeconomics, Macroeconomics, Mathematics, and Statistics.

Table 2: ANPEC Ranking and Ph.D. Placement of Master's Programs Enrollees (Only 250 top-ranked applicants in the 2004-2017 ANPEC exam)

Program	Enrollment	ANPEC ranking (without Brazilian Economy)						Ph.D. programs			
		Top	Bottom	Median	Mean	1-15	1-30	All	Abroad	Top 8 (Any Field)	Top 8 (Only Economics)
PUC_RIO	197	1	54	19	19	0.42	0.79	0.58	0.40	0.16	0.14
FGV_EPGE	239	1	67	30	30	0.28	0.51	0.64	0.34	0.13	0.12
IPE_USP	280	1	101	51	50	0.10	0.23	0.50	0.20	0.02	0.01
FGV_EESP	192	1	219	70	73	0.10	0.19	0.60	0.20	0.06	0.05
UNB	209	3	249	105	110	0.01	0.04	0.40	0.07	0.01	0.01
USP_RP	123	14	248	151	158	0.01	0.02	0.35	0.05	0.00	0.00
UFPE	62	26	245	186	174	0.00	0.02	0.79	0.10	0.00	0.00
UFMG	154	15	246	153	153	0.01	0.01	0.45	0.09	0.01	0.00
UFRJ	297	9	250	133	135	0.00	0.01	0.39	0.04	0.00	0.00
UNICAMP	133	17	246	158	156	0.00	0.01	0.60	0.06	0.00	0.00
UFU	2	21	228	125	125	0.00	0.50	0.00	0.00	0.00	0.00
ESALQ	30	83	238	188	180	0.00	0.00	0.53	0.07	0.00	0.00
PUC_RS	2	75	242	159	159	0.00	0.00	0.00	0.00	0.00	0.00
PUC_SP	29	108	248	203	188	0.00	0.00	0.14	0.00	0.00	0.00
UCB	32	59	249	191	184	0.00	0.00	0.38	0.00	0.00	0.00
UEL	2	213	247	230	230	0.00	0.00	1.00	0.00	0.00	0.00
UEM	1	223	223	223	223	0.00	0.00	0.00	0.00	0.00	0.00
UERJ	24	65	247	193	182	0.00	0.00	0.17	0.00	0.00	0.00
UFBA	6	171	241	229	213	0.00	0.00	0.50	0.00	0.00	0.00
UFCE	36	65	238	165	161	0.00	0.00	0.58	0.03	0.00	0.00
UFES	8	90	232	215	198	0.00	0.00	0.25	0.00	0.00	0.00
UFF	96	66	250	197	185	0.00	0.00	0.34	0.01	0.00	0.00
UFJF	32	105	244	217	199	0.00	0.00	0.41	0.00	0.00	0.00
UFPB	2	195	214	205	205	0.00	0.00	0.50	0.00	0.00	0.00
UFPEL	1	198	198	198	198	0.00	0.00	1.00	0.00	0.00	0.00
UFPR	27	50	249	205	202	0.00	0.00	0.41	0.07	0.00	0.00
UFRGS	142	54	250	185	177	0.00	0.00	0.44	0.06	0.00	0.00
UFRN	1	229	229	229	229	0.00	0.00	0.00	0.00	0.00	0.00
UFSC	19	115	246	229	209	0.00	0.00	0.11	0.00	0.00	0.00
UFSCAR	5	136	250	212	206	0.00	0.00	0.40	0.20	0.00	0.00
UFV	9	161	245	209	212	0.00	0.00	0.67	0.00	0.00	0.00
UNESP	10	115	250	185	187	0.00	0.00	0.30	0.00	0.00	0.00
UNIFESP	1	147	147	147	147	0.00	0.00	0.00	0.00	0.00	0.00

Notes: The table reports the descriptive statistics of our 2004-2017 sample. We consider only the most recent ANPEC subscription, and the applicants ranked in the first 250 positions with non-missing undergraduate degree information. Enrollment represents the sum of the number of students who have attended the program for all the sample years. We consider the ANPEC ranking that equally weights the subjects of Microeconomics, Macroeconomics, Mathematics, and Statistics (i.e., without Brazilian Economy). The ANPEC ranking is the most relevant ranking for placement in Ph.D. abroad and is used by the top four in most years of our sample. We show the lowest, highest, median, and mean ANPEC ranking by program and the percentage of students enrolled in the top 15 (1-15) and top 30 (1-30) positions. We also show the Ph.D. placement percentage of students enrolled in Ph.D. programs in any field in Brazil or abroad (All) or only abroad (Abroad). The top eight Ph.D. programs are MIT, Harvard, Stanford, Chicago, Princeton, Yale, Berkeley, and Northwestern; see Table A.1. We consider the top eight programs in either any field or just economics.

4 Empirical strategy

Our objective is to estimate the impact of attending a particular selective institution on a Ph.D. placement abroad by comparing master's programs within the top four programs.[18] The main challenge in measuring a particular master's program effect is to distinguish it from students' unobservable characteristics.

When comparing the Ph.D. placements of different master's programs, there are at least two potential selection issues. The first is the institution selection bias that occurs since institutions may select students

[18] As explained in Section 3, the top four master's programs are FGV-EESP, FGV-EPGE, PUC-Rio, and IPE-USP.

Table 3: Descriptive Statistics (2004-2017) - Top Four Master's Programs

	Top four		FGV-EESP	FGV-EPGE	PUC-RIO	IPE-USP	Top four (matched sample)
	Admitted	Enrolled					
Male	0.80	0.81	0.81	0.83	0.82	0.78	0.85
Single	0.96	0.97	0.96	0.97	1.00	0.95	0.99
White	0.85	0.86	0.86	0.88	0.90	0.82	0.88
Age	23.56	23.16	23.72	23.10	22.71	23.17	22.87
	(3.14)	(2.44)	(3.04)	(2.63)	(1.64)	(2.23)	(1.96)
Undergraduate degree in the same city	0.56	0.57	0.67	0.54	0.45	0.62	0.50
Undergraduate degree in the same institution	0.34	0.30	0.13	0.23	0.27	0.49	0.28
Took the ANPEC exam within a year after bachelor's degree	0.63	0.64	0.58	0.69	0.65	0.64	0.66
Standardized ANPEC Score	1842.21	2083.86	1693.42	2252.49	2452.36	1948.39	2466.02
	(630.35)	(527.53)	(608.09)	(408.02)	(378.61)	(406.53)	(360.46)
Microeconomics	1.90	2.16	1.73	2.41	2.60	1.95	2.63
	(0.89)	(0.82)	(0.91)	(0.70)	(0.69)	(0.70)	(0.66)
Macroeconomics	1.77	1.95	1.62	2.05	2.28	1.87	2.28
	(0.70)	(0.65)	(0.70)	(0.63)	(0.53)	(0.57)	(0.56)
Statistics	1.88	2.13	1.72	2.30	2.52	1.98	2.51
	(0.80)	(0.71)	(0.82)	(0.58)	(0.59)	(0.62)	(0.56)
Mathematics	1.83	2.09	1.70	2.26	2.42	2.00	2.44
	(0.80)	(0.68)	(0.65)	(0.62)	(0.59)	(0.64)	(0.55)
Observations	1,302	908	192	239	197	280	310

Notes: The table reports the descriptive statistics of our sample, which includes applicants who enrolled in a top-four master's program between 2004 and 2017. We consider only the most recent ANPEC subscription and the applicants ranking in the first 250 positions with non-missing undergraduate degree information. We show the average of variables for all students admitted or enrolled in the top four. We also show the results for the matched sample, which contains students who applied and were admitted by the top four master's programs (Dale and Krueger, 2002). The ANPEC score equally weights the Microeconomics, Macroeconomics, Mathematics, and Statistics standardized scores. Undergraduate degrees in the same city and institution consider change between college and master's programs. Standard deviations are shown in parentheses.

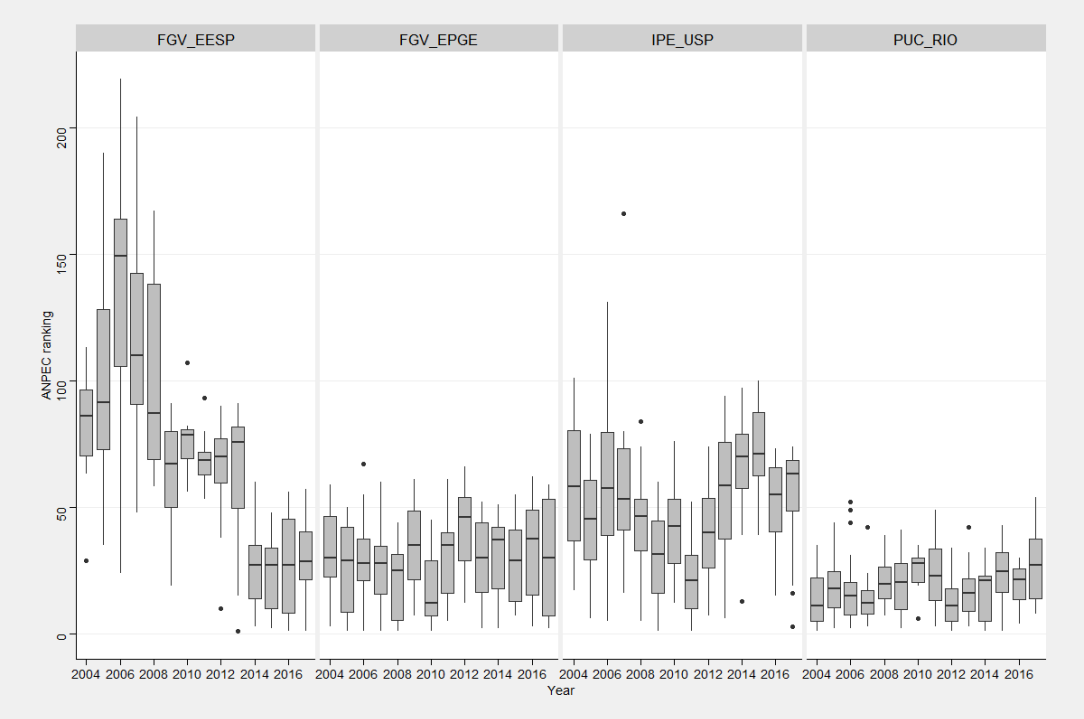

Figure 1: ANPEC Ranking across Top Four Institutions by Year

based on characteristics that are unobserved by the researcher. Then, the most skilled students are likely to be admitted to more competitive and selective institutions. The second problem is the student selection bias that occurs when the students choose institutions they want to attend. Students who attend more selective institutions may have different unobserved abilities than those who attend relatively less selective institutions. In both cases, the unobservable abilities may correlate with the analyzed potential

outcome, which is Ph.D. enrollment abroad. Thus, comparing the placement of students who have attended different institutions can lead to erroneous conclusions.

To address these potential selection problems, we adopt the empirical strategy proposed by Dale and Krueger (2002), which matches students who applied to and were admitted by the same institutions. That match deals with the institution selection problem and can at least partially address the student application bias problem.[19] Indeed, when choosing master's programs, students reveal a preference for more or less selective institutions. Moreover, this preference possibly correlates with the student's unobservable characteristics related to the potential outcome.

Denote the outcome by Y_{ic}, a dummy variable equal to one if the applicant i attended a Ph.D. abroad after the master's degree.[20] To allow for distinct levels of Ph.D. reputation, we consider a Ph.D. in any field overall and at a top-eight university.[21] We regress the outcome on binary variables of assignment, D_i^j, which is one if student i attended institution j, and zero otherwise. We control for the applicant's ANPEC score (i.e., the score that weights the subjects of Microeconomics, Macroeconomics, Mathematics, and Statistics equally) using a cubic polynomial, $f(S_i)$, to allow for a non-linear impact of ANPEC performance on placement. We also include year and college fixed effects (δ_t and η_c). Our main regression equation is:

$$Y_{ic} = \sum_{j}^{3} \beta_j D_i^j + \gamma f(S_i) + \delta_t + \eta_c + \epsilon_i, \tag{1}$$

where ϵ_i is the error term. In all estimates, we cluster standard errors by ANPEC year. Since we have only 14 clusters, we also compute wild bootstrap p-values using Roodman (2015). The parameters of interest are β_1, β_2 and β_3. Each of these β_j parameters represents the effect of attending the j institution relative to a baseline institution. In this regression, we can test if the institution's effect equals zero among the four institutions through an F-test. We do this exercise for the sample that includes all individuals who enrolled in a top-four master's program and the matched sample of students who applied for and were accepted by all the top four master's programs.

[19] In the unlikely scenario in which enrollment choices are random among the feasible master's programs, this approach would completely address the student applicant bias.

[20] We consider Ph.D. attendance rather than conclusion since we want to measure the program's capacity to place its students into a Ph.D. program abroad.

[21] The top eight Ph.D. programs are MIT, Harvard, Stanford, Chicago, Princeton, Yale, Berkeley, and Northwestern (see Table A.1 in Appendix A).

5 Main Results

Table 4 presents the results for attending a Ph.D. in any field of study abroad. We first examine the sample that includes all students enrolled in one of the top four programs. We run our specification in column (1) without any control variables. The results indicate a sizable advantage for FGV-EPGE and PUC-Rio compared to FGV-EESP, the baseline program, in placing their students in Ph.D. programs abroad. In column (2), we add fixed effects for applicants' undergraduate degrees, which slightly reduces the magnitude of these coefficients. Still, these results indicate large effects associated with attending FGV-EPGE and PUC-Rio relative to FGV-EESP, corresponding to 43.1% and 70.1%, respectively. Interestingly, once we control for applicants' ANPEC scores, the coefficients for the two programs become very close to zero and statistically insignificant. The coefficient for IPE-USP in column (3) is negative but close to zero and statistically insignificant, with a wild bootstrap p-value of 0.569.

While the results in columns (1)-(3) include important controls for observables, we may worry that applicants selecting the different top programs may differ in some relevant unobserved way. Therefore, we restrict our analysis to the sample of students applying and receiving offers from the top four programs in columns (4)-(6). As explained in Section 4, this matched sample allows us to at least partially address selection on unobservables by making our sample more comparable on potentially relevant characteristics.

Once we account for such unobservables, the differences between the top four programs nearly vanish. FGV-EPGE, PUC-Rio, and IPE-USP coefficients become very close to zero and statistically insignificant. The IPE-USP coefficient is negative and significantly reduced once we control for college fixed effects and ANPEC scores, with a wild bootstrap p-value of 0.655. The reduction in the coefficient estimate in column (6) relative to column (4) suggests that part of the IPE-USP disadvantage stands because it attracts students with relatively worse ANPEC performance.

Considering that institutions do not differ significantly in Ph.D. enrollments programs abroad, we now check whether some institutions stand out when considering programs with higher reputations. We show the results in Table 5 restricting our outcome variable to attendance to a top-eight Ph.D. program in any field abroad.[22] Focusing on columns (1) and (2) that compare all students, we see that FGV-EPGE and PUC-Rio enroll their students with a higher likelihood in the top eight Ph.D. programs. Controlling for the applicants' college fixed effects, FGV-EPGE and PUC-Rio estimators remain significant and large, corresponding to increases of 108.2% and 151.8% in the probability of attending a top eight Ph.D.

[22] We performed the same regression considering only Ph.D. in Economics, and the results are similar. The top eight Ph.D. programs are MIT, Harvard, Stanford, Chicago, Princeton, Yale, Berkeley, and Northwestern; see Table A.1.

Table 4: Probability of attending a Ph.D. abroad in any field, top four institutions

	All Students			Same Option and Admission Students		
	(1)	(2)	(3)	(4)	(5)	(6)
FGV-EPGE	0.138**	0.121*	0.006	0.017	0.031	-0.026
	(0.052)	(0.060)	(0.053)	(0.080)	(0.109)	(0.088)
	[0.027]	[0.062]	[0.925]	[0.825]	[0.766]	[0.740]
PUC-RIO	0.201***	0.197***	0.019	-0.005	0.007	-0.002
	(0.054)	(0.054)	(0.042)	(0.049)	(0.087)	(0.068)
	[0.001]	[0.001]	[0.648]	[0.920]	[0.926]	[0.972]
IPE-USP	-0.007	-0.001	-0.021	-0.120	-0.126	-0.044
	(0.046)	(0.044)	(0.034)	(0.081)	(0.109)	(0.090)
	[0.887]	[0.983]	[0.569]	[0.207]	[0.272]	[0.655]
F-test	0.000	0.003	0.847	0.142	0.058	0.913
Dependent variable (mean)	0.281	0.281	0.281	0.371	0.371	0.371
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
College fixed effects	No	Yes	Yes	No	Yes	Yes
ANPEC score (cubic polynomial)	No	No	Yes	No	No	Yes
Number of observations	908	908	908	310	310	310

Notes. The dependent variable is a binary variable equal to one if the applicant attended a Ph.D. program abroad in any field and zero otherwise. FGV-EESP is the baseline institution. FGV-EPGE, PUC-Rio, and IPE-USP are dummy variables equal to one if the applicant enrolled in the master's program at FGV-EPGE, PUC-Rio, and IPE-USP, respectively, and zero otherwise. We control for ANPEC year and college (undergraduate) fixed effects. The ANPEC score equally weights the Microeconomics, Macroeconomics, Mathematics, and Statistics standardized scores. We control for ANPEC scores using a cubic polynomial of scores. The sample 'All Students' contains all students with non-missing undergraduate degree information who enrolled in a top-four master's program. 'Same Application and Admission' is the matched sample, which is the 'All Students' sample restricted to students who were admitted and chose the top four programs (Dale and Krueger, 2002). Cluster-robust standard errors are shown in parentheses (at the ANPEC year level). *Significant at 10%; **significant at 5%; ***significant at 1%. Due to the small number of clusters (i.e., fourteen), we also report wild bootstrap p-values calculated using Roodman (2015) in square brackets.

abroad relative to FGV-EESP, respectively.

However, if we control for the ANPEC scores or compare only students who applied and were admitted to the top four programs, FGV-EPGE and PUC-Rio coefficients become statistically insignificant. In contrast, the coefficient for IPE-USP is negative but marginally significant at the 10% level in column (4). Adding college fixed effects and ANPEC score as controls, all coefficients become statistically insignificant. The coefficients for FGV-EPGE and PUC-Rio are not negligible, corresponding to an increase of 33.5% and 43.0% in the probability of attending a top eight Ph.D. program relative to FGV-EESP, respectively. However, these coefficients are imprecisely estimated with a wild bootstrap p-value of 0.512 and 0.413.

One concern with our admission inference method presented in Section 3 is that it can be subject to measurement error. In particular, if the top four institutions consider other elements, apart from the ANPEC score, they may not send admission offers to some ANPEC applicants that are better-ranked than the last applicant admitted. To deal with that possibility, we reestimate the equation (1), restricting

Table 5: Probability of attending a top eight Ph.D. abroad in any field, top four institutions

	All Students			Same Option and Admission Students		
	(1)	(2)	(3)	(4)	(5)	(6)
FGV-EPGE	0.066**	0.092***	0.043	0.015	0.084	0.053
	(0.025)	(0.029)	(0.036)	(0.093)	(0.094)	(0.078)
	[0.022]	[0.008]	[0.272]	[0.868]	[0.408]	[0.512]
PUC-RIO	0.100***	0.129***	0.035	0.003	0.075	0.068
	(0.023)	(0.028)	(0.038)	(0.067)	(0.063)	(0.084)
	[0.002]	[0.001]	[0.398]	[0.971]	[0.229]	[0.413]
IPE-USP	-0.044*	-0.033	-0.027	-0.148*	-0.133	-0.077
	(0.021)	(0.020)	(0.027)	(0.077)	(0.079)	(0.082)
	[0.036]	[0.100]	[0.313]	[0.066]	[0.064]	[0.319]
F-test	0.000	0.000	0.054	0.000	0.005	0.056
Dependent variable (mean)	0.085	0.085	0.085	0.158	0.158	0.158
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
College fixed effects	No	Yes	Yes	No	Yes	Yes
ANPEC score (cubic polynomial)	No	No	Yes	No	No	Yes
Number of observations	908	908	908	310	310	310

Notes. The dependent variable is a binary variable equal to one if the applicant attended a top eight Ph.D. program abroad and zero otherwise. The top eight Ph.D. programs are MIT, Harvard, Stanford, Chicago, Princeton, Yale, Berkeley, and Northwestern; see Table A.1. FGV-EESP is the baseline institution. FGV-EPGE, PUC-Rio, and IPE-USP are dummy variables equal to one if the applicant enrolled in the master's program at FGV-EPGE, PUC-Rio, and IPE-USP, respectively, and zero otherwise. We control for ANPEC year and college (undergraduate) fixed effects. The ANPEC score equally weights the Microeconomics, Macroeconomics, Mathematics, and Statistics standardized scores. We control for ANPEC scores using a cubic polynomial of scores. The sample 'All Students' contains all students with non-missing undergraduate degree information who enrolled in a top-four master's program. 'Same Option and Admission' is the matched sample, which is the 'All Students' sample restricted to students who were admitted and chose the top four programs (Dale and Krueger, 2002). Cluster-robust standard errors are shown in parentheses (at the ANPEC year level). *Significant at 10%; **significant at 5%; ***significant at 1%. Due to the small number of clusters (i.e., fourteen), we also report wild bootstrap p-values calculated using Roodman (2015) in square brackets.

the sample to ANPEC applicants ranked in the top 25 positions. Students ranked in the first 25 positions are typically admitted to all the top four programs they apply to. For this sample, institutions are less likely to use other admission devices such as letters of recommendation and transcripts, relying mostly on ANPEC rankings.

We show the results in Tables A.2 and A.3. Interestingly, most FGV-EPGE, PUC-Rio, and IPE-USP coefficients are negative and statistically insignificant for this reduced sample. For this sample, there is no advantage of FGV-EPGE and PUC-Rio relative to FGV-EESP, even not accounting for observable and unobservable applicants' characteristics in top-eight Ph.D. placements abroad. For this reduced sample, we cannot exclude a sizable disadvantage of IPE-USP relative to FGV-EESP in placements abroad, though imprecisely estimated for top-eight Ph.D. programs.

Overall, our results suggest that once we account for the selection on observables and unobservables, most Brazilian top master's programs are similar in terms of Ph.D. placement abroad. In particular, the programs' effects are greatly reduced when controlling for ANPEC scores and using the matched sam-

ple. In addition, most effects are not statistically significant at the 10% level once we restrict the analysis to ANPEC applicants ranked in the 25 first positions, a sample possibly less subject to measurement error. The only exception is IPE-USP, which seems to have a relative disadvantage in Ph.D. placements abroad in this reduced sample.

6 Conclusion

This paper investigates the impact of Brazilian top master's programs in placing their graduates in Ph.D. programs abroad. Historically, these programs have different Ph.D. placement rates. FGV-EPGE and PUC-Rio placed more than one-third of their graduates in Ph.D. programs abroad and around 15% in the top eight Ph.D. programs abroad. However, since these are also the programs attracting better-ranked students, in terms of the Economics graduate programs admission exam (i.e., the ANPEC exam), it is unclear whether their success is due to the programs or observable and unobservable characteristics of their students.

To address selection by institutions and students, we use the methodology suggested by Dale and Krueger (2002) that matches students who applied to and were accepted by the same top four institutions. Our results show that the impact of institutions is severely reduced once we control for students' performance in the ANPEC exam or compare only students with the same set of options and offers. In those cases, most programs are similar, except for IPE-USP, which has a lower relative success in Ph.D. programs abroad, though imprecisely estimated.

Our results add to a growing literature focused on the impact of selective institutions by investigating the role of graduate programs, a level previously unexploited in this literature. As in the undergraduate literature, our results suggest that the impact of selective institutions is small or nil once we account for students' self-selection into universities. Moreover, our study also contributes to the tiny literature on the determinants of graduate school enrollment, suggesting that individual characteristics play a major role in such outcomes.

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A Appendix - Tables and Figures

Table A.1: Ph.D. Programs Rankings

Ranking	Amir and Knauff (2008), R3 score	US News (2022)
1	MIT	Harvard U
2	Harvard U	MIT
3	Stanford U	Stanford U
4	U Chicago	Princeton U
5	Princeton U	UC-Berkeley
6	Yale U	U Chicago
7	UC-Berkeley	Yale U
8	Northwestern U	Northwestern U
9	U Minnesota	Columbia U
10	LSE	U Pennsylvania

Notes. We use the top eight Ph.D. programs as our measure of selectivity since they coincide in both rankings.

Table A.2: Probability of attending a Ph.D. abroad in any field, top four institutions - only ANPEC applicants ranked in the 25 first positions

	All Students			Same Option and Admission Students		
	(1)	(2)	(3)	(4)	(5)	(6)
FGV-EPGE	-0.052	-0.051	-0.057	-0.085	-0.076	-0.130
	(0.082)	(0.102)	(0.083)	(0.098)	(0.134)	(0.107)
	[0.565]	[0.584]	[0.438]	[0.444]	[0.618]	[0.200]
PUC-RIO	-0.079	-0.039	-0.005	-0.139	-0.110	-0.100*
	(0.056)	(0.067)	(0.056)	(0.096)	(0.097)	(0.053)
	[0.177]	[0.499]	[0.901]	[0.189]	[0.301]	[0.101]
IPE-USP	-0.255**	-0.235*	-0.156	-0.188*	-0.213*	-0.163*
	(0.088)	(0.117)	(0.104)	(0.095)	(0.107)	(0.086)
	[0.026]	[0.074]	[0.168]	[0.073]	[0.054]	[0.044]
F-test	0.041	0.213	0.454	0.238	0.261	0.166
Dependent variable (mean)	0.443	0.443	0.443	0.447	0.447	0.447
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
College fixed effects	No	Yes	Yes	No	Yes	Yes
ANPEC score (cubic polynomial)	No	No	Yes	No	No	Yes
Number of observations	316	316	316	208	208	208

Notes. We restrict our sample to ANPEC applicants in the 25 first positions according to the ANPEC ranking. The dependent variable is a binary variable equal to one if the applicant attended a Ph.D. program abroad in any field and zero otherwise. FGV-EESP is the baseline institution. FGV-EPGE, PUC-Rio, and IPE-USP are dummy variables equal to one if the applicant enrolled in the master's program at FGV-EPGE, PUC-Rio, and IPE-USP, respectively, and zero otherwise. We control for ANPEC year and college (undergraduate) fixed effects. The ANPEC score equally weights the Microeconomics, Macroeconomics, Mathematics, and Statistics standardized scores. We control for ANPEC scores using a cubic polynomial of scores. The sample 'All Students' contains all students with non-missing undergraduate degree information who enrolled in a top-four master's program. 'Same Application and Admission' is the matched sample, which is the 'All Students' sample restricted to students who were admitted and chose the top four programs (Dale and Krueger, 2002). Cluster-robust standard errors are shown in parentheses (at the ANPEC year level). *Significant at 10%; **significant at 5%; ***significant at 1%. Due to the small number of clusters (i.e., fourteen), we also report wild bootstrap p-values calculated using Roodman (2015) in square brackets.

Table A.3: Probability of attending a top eight Ph.D. abroad in any field, top four institutions - only ANPEC applicants ranked in the 25 first positions

	All Students			Same Option and Admission Students		
	(1)	(2)	(3)	(4)	(5)	(6)
FGV-EPGE	-0.015	0.047	0.060	-0.002	0.052	0.004
	(0.127)	(0.111)	(0.110)	(0.168)	(0.162)	(0.139)
	[0.914]	[0.672]	[0.600]	[0.996]	[0.769]	[0.970]
PUC-RIO	-0.072	-0.028	0.012	-0.067	-0.025	-0.026
	(0.109)	(0.089)	(0.099)	(0.149)	(0.137)	(0.142)
	[0.552]	[0.748]	[0.904]	[0.670]	[0.842]	[0.833]
IPE-USP	-0.229*	-0.232*	-0.156	-0.225	-0.232	-0.223
	(0.110)	(0.110)	(0.106)	(0.150)	(0.144)	(0.146)
	[0.040]	[0.038]	[0.193]	[0.183]	[0.114]	[0.156]
F-test	0.001	0.005	0.004	0.008	0.059	0.073
Dependent variable (mean)	0.203	0.203	0.203	0.226	0.226	0.226
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
College fixed effects	No	Yes	Yes	No	Yes	Yes
ANPEC score (cubic polynomial)	No	No	Yes	No	No	Yes
Number of observations	316	316	316	208	208	208

Notes. We restrict our sample to ANPEC applicants in the 25 first positions according to the ANPEC ranking. The dependent variable is a binary variable equal to one if the applicant attended a top eight Ph.D. program abroad and zero otherwise. The top eight Ph.D. programs are MIT, Harvard, Stanford, Chicago, Princeton, Yale, Berkeley, and Northwestern; see Table A.1. FGV-EESP is the baseline institution. FGV-EPGE, PUC-Rio, and IPE-USP are dummy variables equal to one if the applicant enrolled in the master's program at FGV-EPGE, PUC-Rio, and IPE-USP, respectively, and zero otherwise. We control for ANPEC year and college (undergraduate) fixed effects. The ANPEC score equally weights the Microeconomics, Macroeconomics, Mathematics, and Statistics standardized scores. We control for ANPEC scores using a cubic polynomial of scores. The sample 'All Students' contains all students with non-missing undergraduate degree information who enrolled in a top-four master's program. 'Same Application and Admission' is the matched sample, which is the 'All Students' sample restricted to students who were admitted and chose the top four programs (Dale and Krueger, 2002). Cluster-robust standard errors are shown in parentheses (at the ANPEC year level). *Significant at 10%; **significant at 5%; ***significant at 1%. Due to the small number of clusters (i.e., fourteen), we also report wild bootstrap p-values calculated using Roodman (2015) in square brackets.