

Petterini, Francis C.

Article

Brazilian academic economics: A picture from the ANPEC exam microdata

EconomiA

Provided in Cooperation with:

The Brazilian Association of Postgraduate Programs in Economics (ANPEC), Rio de Janeiro

Suggested Citation: Petterini, Francis C. (2020) : Brazilian academic economics: A picture from the ANPEC exam microdata, EconomiA, ISSN 1517-7580, Elsevier, Amsterdam, Vol. 21, Iss. 3, pp. 325-339,
<https://doi.org/10.1016/j.econ.2020.04.004>

This Version is available at:

<https://hdl.handle.net/10419/266964>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by-nc-nd/4.0/>

Brazilian academic economics: A picture from the ANPEC exam microdata

Francis C. Petterini

Federal University of Santa Catarina, Florianópolis, Brazil

Received 7 February 2020; accepted 23 April 2020

Available online 3 June 2020

Abstract

The ANPEC exam has been an important instrument for the Brazilian academic economics since the 1970s. Nowadays, practically all graduate program in economics uses it as selection mechanism. This research has tabulated its microdata to produce a picture of what these numbers can reveal about recent past. The main highlights are: master courses demand and supply are numerically closer; students' profiles are not changing, mostly they are white men; many candidates seems to answer at random; outcomes in EB test are little correlated with other results; an applicant needs to correctly answer at least three questions (out of 15) in each test to be selected in most programs; many well-ranked students are not selected anywhere; candidates tend to stay in their home states; and, applicants' motivations and expectations are ambiguous.

JEL classification: A23; C29; I23; R53

Keywords: Academic economics; ANPEC exam; Microdata analyses

© 2020 The Author. Production and hosting by Elsevier B.V. on behalf of National Association of Postgraduate Centers in Economics, ANPEC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Academic economics can be understood as the process of professionalization of economists that occurs in graduate school, although its conceptual discussion may be much broader (Leontief, 1982; Colander and Klammer, 1987; Krueger, 1991; Klammer, 2014). The literature describing its origin in Brazil gives special attention on the creation of the Associação Nacional dos Centros de Pós-Graduação em Economia (National Association of Centers for Post Graduate Economics, ANPEC), the institution congregates economics graduate schools in the country since 1973 (Haddad, 1981; Loureiro, 1997; Versiani, 1997; Fernández and Suprinyak, 2018). Additionally, some scientometric analysis of these schools is also prominent (Azzoni, 2000; Faria, 2000, 2009; Sidone et al., 2017; Haddad et al., 2017).

The history reveals that an important instrument to set up the ANPEC was a standardized national admission test, such that bibliography and examples of questions were publicized over the years, inducing a convergence in the economics teaching in Brazil. The system has been applied since the mid-1970s, and in some moment it became known as the “ANPEC exam”. Nowadays, there are more than 50 academic graduate programs in economics in the country, and among them only the Federal University of Maranhão does not use the exam.

E-mail address: f.petterini@ufsc.br

<https://doi.org/10.1016/j.econ.2020.04.004>

1517-7580 © 2020 The Author. Production and hosting by Elsevier B.V. on behalf of National Association of Postgraduate Centers in Economics, ANPEC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

The current arrangement was established in 1991, with six main elements. First, all tests from previous editions are disclosed. Second, each candidate nominates six programs of interest, and completes a questionnaire reporting personal characteristics. Third, *Macroeconomics*, *Microeconomics*, *Mathematics*, *Statistics*, *Brazilian Economy (EB)* and *English* tests are applied. Fourth, a penalty rule is used, where outcomes in a negative scale suggest weak candidates. Fifth, individual scores generate candidates rankings. Sixth, given rankings and program choices made by the students, a matching process defines where each applicant goes.

The exam microdata has been stored since the 1997 edition – for the 1998 enrollments –, although in some years a bit of information have been lost. This research has tabulated and analyzed all available information, with the purpose of producing a picture of the Brazilian academic economics, once the exam is the first step in the national process of economists professionalization in high level. In this article, the objective is threefold: to describe these data; to interpret what the numbers can reveal in recent years; and, to support eventual discussions on how to improve the system and perchance the programs.

The main highlight is that the demand for master programs tends to grow, but with significant fluctuations. On the other hand, the supply was stable until 2007, and then it has been growing year after year. In the 2020 edition, there was almost one vacancy to each candidate that concluded the exam, and around 40% of the vacancies offered were not occupied, which was the worst matching indicator in history. This scenario seems to be related to the Programa de Apoio a Planos de Reestruturação e Expansão das Universidades Federais (Restructuring and Expansion of Federal Universities Program, REUNI), that may have generated an uncoordinated proliferation of programs.

Since 2009 the database has regular information about the candidates' characteristics and matching results. In this way, at least eight facts can be highlighted. First, the students' profiles have not changed, mostly they are white men with undergraduate in economics; after economists, the engineers are most interested in the exam. Second, many candidates fills more wrong than right answers, mainly applicants for doctoral programs; given the test design, this suggests that they prefer to mark questions at random, or may not understand the penalty system where an error nullifies a hit. Third, the correlations among results in Macro, Micro, Math and Stat tests are around.7; and the correlations among performances in these tests and the EB test are around.2. In short, this is giving numbers to justify the well established rankings with/without EB. Fourth, a candidate needs to answer correctly at least three questions (out of 15) per test to avoid a negative standardized score, and it is sufficient to entry in most programs. Fifth, the individual performance behaves like statistics of extremes (Beirlant et al., 2006). Given this last point, some regressions are made to identify the best performing candidate profile, and a curious result is that, controlling by covariates, engineers tend to be better than economists in the exam. Sixth, many well-placed candidates do not enter in any program; it seems to be because they do not show performance good enough to enter into the desired program, and prefer to repeat the exam than choose an alternative institution. Seventh, 2/3 of the applicants do not leave their home states; and, 2/3 of them have origin and destination in the states of São Paulo, Rio de Janeiro, Minas Gerais and Paraná. Eighth, students' motivations and expectations are ambiguous, and the understanding of this point may be essential to prevent programs closed due to lack of demand.

Besides this introduction, the manuscript has five more sections. In Section 2, demand and supply data are presented and discussed. Section 3 show statistics about candidates' profiles. Section 4 discuss performances and statistics of extremes. Section 5 analyses the matching processes. The last section presents final remarks, with some viewpoints in order to improve the system, as well as themes for future research.

2. Demand and supply

This section discusses demand and supply from 1997 to 2020 exam editions. The emphasis is on master programs, where the exam is the fundamental selection mechanism. In addition, only academic courses are considered, because professional programs are relatively new.

2.1. Master programs

Fig. 1 presents exams editions and numbers of master programs candidates (demand) and total vacancies (supply) according to candidate's manual, as well as trend lines. The quantities of applicants are not considering who has missed or been disqualified from at least one test (15–20% of the total, depending on the year); who claims to be

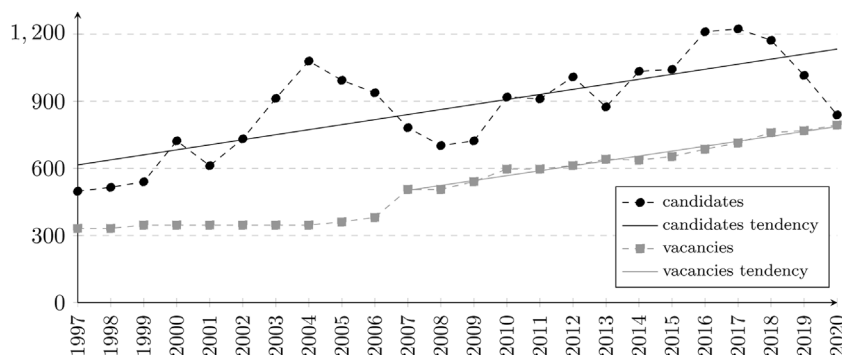


Fig. 1. Exam editions and numbers of master programs candidates and total vacancies. Data source: ANPEC.

training (around 3%); and, who only applies to professional programs (less than 1%). Moreover, the vacancies are not considering professional programs (INSPER and MACKENZIE).

The lowest number of applicants was 498 in the 1997 edition, and the largest was 1224 in the 2017 edition. Since 1997 there have been two major fluctuations in demand: a peak in 2004 and a valley in 2008, whose difference is 348 (candidates); and, other peak in 2017 and a minor number in 2020, whose difference is 385. A more complete perspective of the candidates' characteristics is available only after 2009, so it is not possible to identify if there has been a change of observable profiles on all that time.

Making a conjecture, if the researcher believes in monetary incentives, a hypothesis could consider the scholarships values. But that seems to make little sense for the first fluctuation, since in 2004 there was an increase in amounts paid by CAPES/CNPq, from R\$ 725 to R\$ 1073. Although it may make sense in the second fluctuation, once the government announced several cuts in the scholarships for 2019 and 2020. Nevertheless, these fluctuations may just to be the result of a myriad of undetectable idiosyncrasies that may change between cohorts.

Overall, the data show an increasing trend of applicants, whose slope is 22 per year. In short, the fact is that there is a trend of increasing demand, with significant fluctuations.¹

On the other hand, the vacancies were stable around 340 between 1997 and 2006, with slight offer adjustments of the 19 historical participants (CAEN, CEDEPLAR, FGV-RJ, FGV-SP, NAEA, PIMES, PUC-RJ, PUC-SP, UFBA, UFES, UFF, UFPB, UFPR, UFRGS, UFRJ, UFSC, UnB, UNICAMP and USP). For example, in 2004 the UFRGS was divided into “applied economics” and “development economics” programs, offering more vacancies; and, it also happened in the UFBA few years ahead. Given these cases, eventually programs and institutions are considered as synonyms.

In 2007 the system started to receive other participants, reaching the number of 31 newcomers in the 2020 edition (ESALQ, FURG, PUC-RS, UCB, UEL, UEM, UEPG, UERJ, UERN, UFABC, UFAL, UFG, UFJF, UFMT, UFOP, UFPA-PPGE, UFPEl, UFPE-PPGECON, UFRN, UFS, UFSCAR, UFSM, UFU, UFV, UFV-EA, UNESP, UNIFAL, UNIFESP, UNIOESTE, UNISINOS and USP-RP). In this period, the vacancies grew at the same mean speed of the number of candidates – i.e., 22 per year. Moreover, given the demand fluctuation, in the last edition there were almost the same number of vacancies (794) and applicants (839) to fill them.

Although there were traditional courses among the new users – e.g., ESALQ –, most of them started the activities close to or after 2007. Furthermore, 19 of them are linked to federal universities. Precisely, putting in parentheses the year in which these courses begun according to CAPES: FURG (2010), UFABC (2017), UFAL (2012), UFG (2015), UFJF (2006), UFMT (2012), UFOP (2015), UFPA-PPGE (2013), UFPE-PPGECON (2012), UFPEl (2011), UFRN (2006), UFS (2015), UFSCAR (2010), UFSM (2011), UFU (2006), UFV (2006), UFV-EA (2010), UNIFAL (2017) and UNIFESP (2016).

In the 2020 edition, the institutions that were in the system since before 2007 offered 376 vacancies; the newcomers from federal universities offered 253; and, the newcomers from state or private programs offered 165. Consequently,

¹ Loureiro (1997) documents that there were around 50 candidates by year in the 1970s, when the participant programs were FGV-RJ, PUC-RJ, UFRJ, USP and UNICAMP. Curiously, if the researcher makes a table putting 50 candidates in 1975, and starts adding 22 candidates per year, in 1997 the result is 534, close to the observed number of 498.

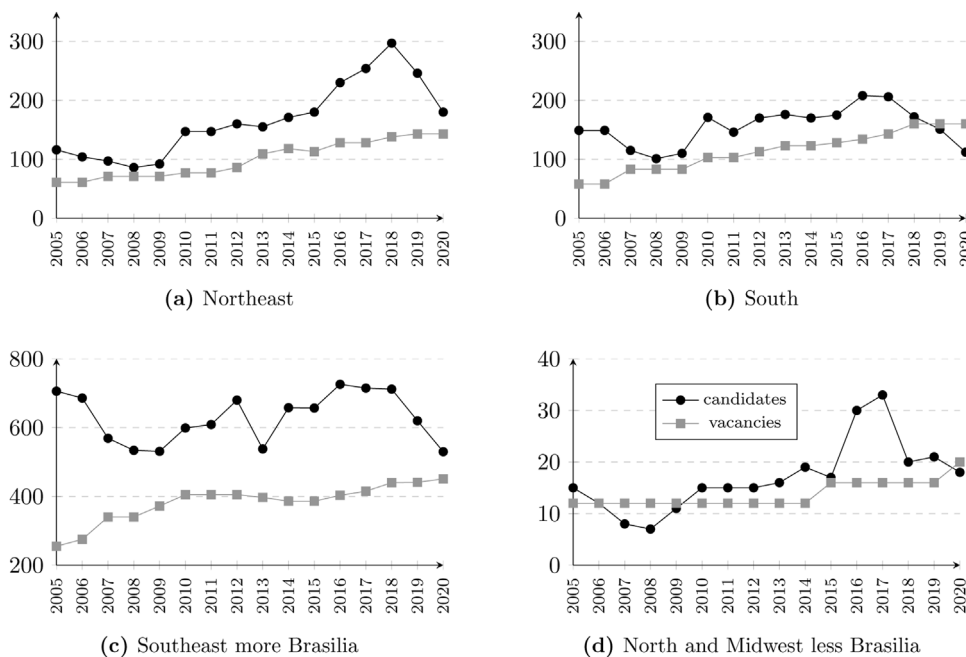


Fig. 2. Exam editions and numbers of master programs candidates and total vacancies, by selected regions. Data source: ANPEC.

61% [$\approx 253/(253 + 165)$] of the new vacancies were in new programs of federal universities. This is sufficient to suspect that the REUNI caused a substantial part of the supply increase.

The REUNI was created in 2007 to expand the access to higher education through by a strong injection of funds into federal universities. It was done until the end of Lula's administration and beginning of Dilma's administration in 2011.

By 2007 there were 45 federal universities, with 148 campuses distributed in 114 municipalities; around 340 thousand undergraduate and graduate vacancies were being offered, and around 30 thousand professors with doctoral degree and exclusive dedication were working in all areas of knowledge. With the REUNI, 14 new federal universities and 126 new campuses were implemented; the number of municipalities served by a federal university campus reached 230; and the numbers of vacancies and professors doubled (Silva et al., 2018; Barbosa et al., 2019).

This scenario seems to have generated an uncoordinated proliferation of graduate programs in economics, and probably in other areas too, in the following sense: many young doctors were hired to new campuses, in regions without graduate programs; there was much government resource available and new infrastructures were being deployed; then, if these new professors make a master project, it will probably give them the right to appropriate of a share in these resources and infrastructures. In this context, possibly many groups of young professors have preferred to make some graduate program first and ask about demand later, and the government supported this movement.

From 2005 onward it is possible to identify the candidates' address. Taking this into account, Fig. 2 replicates the previous analysis by separating applicants and vacancies by regions, to try identify if there is a local unbalance of demand and supply.

Fig. 2(a) presents the Northeast situation, where the demand reached almost 300 candidates in 2018, and fell in subsequent editions; despite the vacancies growing, the local supply has never been exceeded by the local demand. This does not happen in the South, as can be seen in Fig. 2(b), since no tendency to increase candidates is identified and a tendency to increase vacancies is clear. Fig. 2(c) presents the Southeast (more Brasilia) situation, where apparently there is no unbalance. Finally, Fig. 2(d) shows the North and Midwest (less Brasilia) situation, which represents a very small portion of the national scene. In short, if it makes sense to talk about regional asymmetry between demand and supply, the problem is happening in the South.

Table 1
Exam editions and numbers of doctoral programs candidates and total vacancies. Data source: ANPEC.

Edition	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Candidates	14	25	27	57	73	115	111	127	146	186	206	177
Vacancies	10	23	25	51	56	66	86	101	109	124	134	159

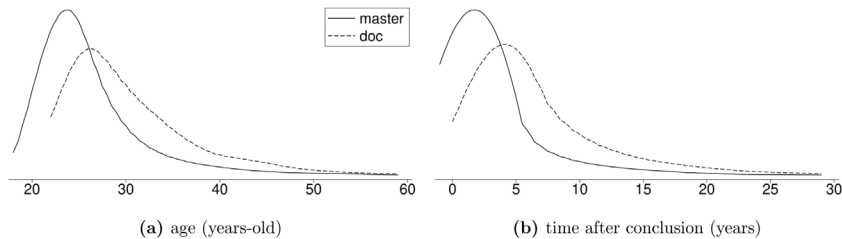


Fig. 3. Smoothed histograms for age and time after undergraduate conclusion, by master and doctoral candidates, from 2009 to 2020 editions. Data source: ANPEC.

2.2. Doctoral programs

The exam was first used for the doctoral selection in the 2009 edition by the UFPR, and in the next editions on average one program per year was adhering to the system. Nowadays, 14 institutions use it, half of the country's programs according to CAPES.

Table 1 presents the editions and the numbers of candidates and total vacancies. These numbers tend to follow each other, and the size of both is much smaller than the master counterparts. Moreover, unlike the master programs, where the exam is usually the unique classifying element, in the doctoral programs the institutions commonly request research projects and sometimes interviews. Which makes the exam an auxiliary piece in the selection context, without much to discuss.

3. Candidates' characteristics

Since 2009 the database has regular information about the candidates' characteristics. In this way, Fig. 3(a) and (b) is presenting smoothed histograms for age and time after undergraduate conclusion, both in years, by master and doctoral applicants. While the age concentration for the master case is around 25 years-old, for the doctoral case is around 29 years-old; and while the frequency concentration of time after undergraduate conclusion is around one or two years for the master case, it is around five years for the doctoral case. This seems to indicate that it is common for students to begin their doctoral course immediately after completing their master course. Moreover, the correlation between age and time after undergraduate conclusion is 0.89, which sounds very intuitive.

Table 2 shows that around 2/3 of the candidates are white men, and around 85% of them demand scholarship, regardless of whether they are applying for master or doctoral programs. Moreover, around 3% of the master applicants are just training – i.e., they have not completed the undergraduate, or will not complete it in time; most doctoral candidates have taken the exam in some previous edition; there are more doctoral applicants that have studied at public universities than master ones; single people are more frequent candidates for master programs²; and, close to 85% of the candidates have graduate in economics, regardless of whether they are applying for the master or doctoral programs. After economists, engineers and business professionals are most interested in the master courses – which is not true for the doctoral case.³ In general, all these numbers are regular, as can be seen from the breakdown of the years in the middle columns for the master cases.

² The marital status options in the questionnaire are single, married, divorced, widowed and other.

³ Engineering and business are considering every course that uses the words “engenharia” or “administração/gestão”, respectively. Elsewhere, there are a myriad of other listed cases: history, sociology, political science, international relations, law etc.

Table 2

Percentage of candidates by characteristics from 2009 to 2020 editions. Data source: ANPEC.

Characteristic	Edition and % of master candidates' characteristics												Mean	
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Master	Doc
Man	65.4	67.5	63.6	64.9	66.0	68.8	67.8	67.0	66.2	64.2	67.2	67.9	66.4	63.2
White	71.7	68.7	65.7	65.4	67.1	66.1	66.0	64.9	62.9	62.9	60.7	60.0	65.2	62.7
Scholarship	82.1	84.7	84.6	84.9	89.6	87.1	84.9	87.9	87.4	85.4	86.3	86.3	85.9	84.9
Training	3.6	2.4	1.7	3.3	2.4	2.7	2.5	2.5	2.7	4.4	4.4	2.7	2.9	–
Doing again	27.1	24.7	21.1	20.1	23.0	19.8	23.1	21.6	28.9	24.4	26.2	24.2	23.7	77.4
Public university	70.4	72.0	73.9	76.6	73.5	76.7	73.9	77.0	77.3	77.1	79.5	82.4	75.9	88.7
<i>Marital status</i>														
Single	86.9	89.6	88.0	87.0	87.5	87.9	90.2	89.9	86.5	87.9	89.7	89.6	88.4	74.5
Married	10.9	9.7	10.1	11.2	10.5	10.1	8.3	8.7	11.0	9.8	8.7	8.5	9.8	21.5
<i>Undergraduate</i>														
Economics	85.2	87.5	83.6	81.4	87.1	87.7	85.9	86.5	84.0	84.4	86.1	83.1	85.2	88.3
Engineering	3.5	5.9	4.7	4.9	4.2	4.4	3.1	3.4	5.9	5.6	6.3	6.4	4.9	1.7
Business	3.3	2.0	2.7	2.8	3.0	2.8	2.9	2.7	2.9	3.7	3.3	3.0	2.9	2.2

4. Performances

All tests in the exam have 15 nondiscursive questions. The EB test has a discursive section too, but it is not considered here because there are not records about its evaluations. Moreover, the English test also is neglected, because it has no weight for general rankings.

Each question is type A or B. The type A has k true or false items (usually $k = 5$), and the candidate receives scores $1/k$, $-1/k$ or zero if correctly, incorrectly or no answer an item, respectively. The type B has just one numerical item, and the scores are computed as type A considering $k = 1$. All EB nondiscursive questions are type A, and the Macro, Micro, Math and Stat tests usually have 12 or 13 questions of this type. Thus the outcomes per question are in the range -1 to 1 , and per test are in the range -15 to 15 .

Each test has an answer sheet with M items to be filled (usually M is equal to 63, 67 or 75). In every test, hypothetically the candidate knows to answer $m_1 = 0, 1, \dots, M$ items, generating an expected outcome. For simplicity, consider that the candidate's confidence is so great to assume zero variance for this expected outcome. Then, if this person considers to answer randomly m_2 more items, such as m_2 is sufficiently large and $m_1 + m_2 \leq M$, the expected outcome is the same, since an incorrect answer overrides the score of a correct one. But the variance is no longer zero, because there is no confidence about m_2 answers.

Therefore, if an applicant decides to answer randomly, it is equivalent to change from a safe outcome to another with the same expected value but with more risk. Consequently, if a student knows to answer many items, there is no reason to mark at random. Additionally, strictly negative outcomes reveals that the person probably is one of two types: who do not rationalize the penalty system; or, who knows few answers, and then it is worth taking a risk.

4.1. Crude scores

Table 3 shows means and standard deviations (in parentheses) for the crude scores per test – Macro, Micro, Math, Stat and EB – and exam edition. Despite the numbers pattern be the same since the 1997 edition, the analysis focuses from the 2009 edition onward, given the availability of individual covariates to be used in econometric exercises presented ahead. Notably, means and deviations are frequently close to 2 or 3. So, on average, candidates are answering more correctly than incorrectly the items, although these means may seem far from the maximum possible of 15.

Complementary, Table 3 also is presenting the percentage of negative scores [in brackets]. For example, 4.3% of the Macro scores were (strictly) negatives in the 2014 edition, while 18.1% were negatives in the 2012 edition. For Math the number reach 24.8% in the 2017 edition. Unlike the mean and standard deviation, there is no regularity in

Table 3

Mean, standard deviation (in parentheses) and percentage of negative scores [in brackets] for the test scores. Data source: ANPEC.

Test	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Macro	2.28 (2.35) [12.9]	2.72 (2.32) [7.8]	2.88 (2.62) [10.3]	2.13 (2.51) [18.1]	3.79 (2.99) [4.7]	4.09 (2.95) [4.3]	3.57 (2.69) [4.9]	3.58 (2.68) [4.5]	3.44 (3.03) [7.4]	3.14 (2.65) [6.4]	3.43 (3.48) [10.7]	3.21 (3.20) [11.2]
Micro	3.42 (2.86) [4.4]	2.19 (2.40) [13.5]	2.40 (2.32) [10.3]	2.02 (2.18) [14.3]	2.49 (2.41) [11.2]	3.28 (2.79) [6.5]	3.26 (2.93) [6.8]	2.38 (2.81) [13.5]	2.49 (2.26) [8.3]	2.89 (2.98) [11.0]	3.41 (2.83) [4.1]	2.90 (2.47) [4.7]
Math	2.09 (2.74) [16.4]	2.11 (2.75) [14.5]	2.29 (2.59) [22.5]	2.14 (2.67) [14.8]	2.45 (2.57) [11.8]	2.71 (2.70) [6.6]	1.32 (2.20) [11.6]	2.00 (2.38) [13.5]	1.05 (1.72) [24.8]	2.01 (2.51) [7.9]	2.24 (2.53) [16.9]	2.05 (2.64) [19.3]
Stat	1.72 (2.16) [15.3]	1.99 (2.40) [14.9]	1.62 (2.33) [11.6]	2.41 (2.82) [12.8]	2.23 (2.57) [9.2]	3.82 (3.25) [8.0]	3.42 (3.63) [23.8]	2.94 (3.03) [11.2]	2.59 (3.67) [21.6]	3.09 (2.96) [13.0]	3.11 (3.72) [10.4]	1.98 (2.74) [14.9]
EB	3.40 (2.78) [8.4]	4.32 (2.41) [2.0]	3.58 (2.24) [2.1]	3.24 (2.36) [4.8]	3.21 (2.22) [4.3]	2.57 (2.27) [10.3]	2.76 (2.16) [6.1]	2.12 (1.92) [10.5]	2.81 (1.90) [3.8]	2.02 (1.99) [12.2]	1.99 (1.89) [9.6]	1.89 (2.01) [15.6]

these numbers across tests and editions; what may be reflecting an irregularity in the presence of candidates that do not understand the penalty system, or do not know to answer many items. Furthermore, these statistics suggest that it would not surprising to observe one out five candidates answering items at random, because it is not uncommon to see about 15–20% of negative scores on a test.

It is possible to make a modest econometric exercise to obtain an idea of characteristics most associated with negative outcomes. First, defining a binary dependent variable as 1 for strictly negative scores, and 0 otherwise – using the 13,488 observations available for each test between the 2009 and 2020 editions. Second, defining covariates for the following observable characteristics: “doc” as a dummy 1 for a doctoral applicant; “age” in years-old⁴; “man” and “white” as dummies 1 for genre and color, respectively; “scholarship” and “training” as dummies 1 if the candidate needs scholarship and if is training, respectively; “doing again” and “public university” as dummies 1 if the applicant has taken the exam in some previous edition and if has studied at public university, respectively; “single” and “married” as dummies 1 for marital status; and, “economics”, “engineering” and “business” for undergraduate origins. Third, estimating some regressions.

Table 4 shows the results for logit models. In all regressions constants and dummies to control editions idiosyncrasies are omitted, and standard errors have been calculated with 50 resampling bootstrap. The numbers are presented in odds ratios (Cameron and Trivedi, 2005). Therefore, when the ratio associated with a covariate is 1 the exposure does not affect odds of have a negative score (*ceteris paribus*); and, for example, when the number is 2 (1/2) means that the odds of negative scores are twice (half) those of positive ones.

The numbers highlights that doctoral candidates odds of a negative score are greater than master candidates ones. For example, in EB the odds are 60% larger. In addition, the results are showing that a year more in age, which is positively correlated with being a doctoral applicant, also increases the chances of having negative scores in all tests. On the other hand, white men tend to have smaller odds to show negative scores.

A curious result is that who needs a scholarship tend to have larger odds of negative scores, which can be read in reverse: those who do not demand a scholarship has smaller odds of negative scores. An explanation is that usually who do not need scholarship has a public job, whose additional motivation is a wage increase upon completion of the course. Thus, these people may have a better preparation or more caution when taking the test, because success involves a pecuniary benefit.

Additionally, there are evidence that there is no difference if the candidate is training; and who is repeating the exam has no tendency to show negative outcomes, which may indicate learning. Who studied at a public university has no

⁴ Age and time after undergraduate conclusion are not concomitantly used to avoid multicollinearity problems.

Table 4

Estimated results in odds ratios for logits where the dependent variable is 1 for negative scores. Data source: ANPEC.

Covariate	Macro	Micro	Math	Stat	EB
Doc	1.327***	1.056*	1.221**	1.185*	1.604***
Age	1.077***	1.099**	1.083***	1.087***	1.035***
Man	0.421***	0.604***	0.577***	0.609***	0.688***
White	0.720***	0.775***	0.728***	0.654***	0.714***
Scholarship	1.136*	1.247**	1.318***	1.170**	1.095*
Training	0.933	1.041	0.999	0.945	1.052
Doing again	0.580***	0.707***	0.698***	0.612***	0.743***
Public university	0.796***	0.689***	0.650***	0.698***	0.597***
Single	0.971	1.028	1.127	0.979	1.011
Married	1.064	0.965	1.036	1.134	1.129
Economics	0.686***	0.800**	0.956	1.006	0.597***
Engineering	0.591**	0.575***	0.411***	0.533***	1.014
Business	1.225	1.210	1.124	1.145	1.144
McFadden's pseudo- R^2	0.085	0.068	0.063	0.076	0.067

p-values to the odds of being different from unit.* $p < 0.1$.** $p < 0.05$.*** $p < 0.01$.

Table 5

Correlation table for the standardized scores by tests and editions. Data source: ANPEC.

	Macro	Micro	Math	Stat	EB
Macro	1.000				
Micro	0.730	1.000			
Math	0.650	0.706	1.000		
Stat	0.739	0.744	0.708	1.000	
EB	0.285	0.219	0.169	0.143	1.000

tendency to show negative outcomes, which may show that the exam is better known and widespread in this kind of institution. Civil status makes no difference too. Finally, economists tend to be positive results, except in Math and Stat; and, engineers tend to be positive results, except in EB – in relation to those who have a degree in business and other courses.

4.2. Standardized scores

The idiosyncrasies in each test need to be considered to made candidate's rankings. In this sense, the strategy applied since the 1990s is to homogenize the crude scores in terms of standard deviations from the means; just subtracting the individual outcomes from the average in each test, and dividing these values by the standard deviations.

Once these standardized scores have the same unit of measurement, it is possible to compare them among exam editions. In this way, Table 5 is showing a correlation table by tests, from 2009 to 2020 editions. Notably, the correlations between Macro, Micro, Math and Stat tests – one to one – is around .7; and, the correlations between the performances in these tests and the EB test is close to .2.

To synthesize the candidate's performance among the standardized scores, it is used the following weighted arithmetic rule (called as “argumento *semifinal*”): $S = 10 \times \sum_{t=1}^5 w_t S_t$. Where t indexes the tests; $S_t \in \mathbb{R}$ represents the standardized scores; $w_t \in [0, 100]$ are weights, such as $\sum_{t=1}^5 w_t = 100$; and, the multiplication by 10 intends to identify marginal differences between candidates with similar scores. By construction, the synthesis score: (i) can be interpreted as standard deviations from the mean (among all means) when it is divided by one thousand; (ii) has a range in all real number line; and, (iii) is zero [positive/negative] when the person has a performance similar [higher/lower] to the average performance of all candidates in that edition.

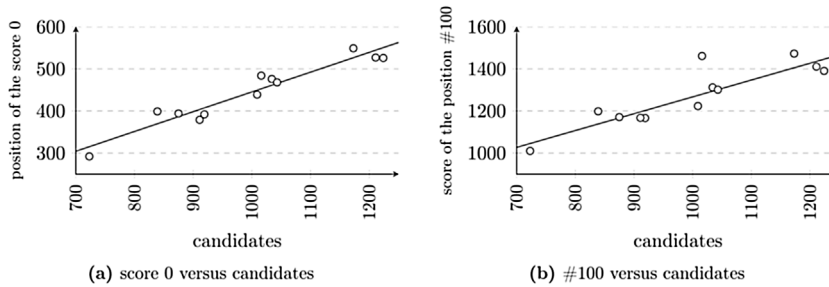


Fig. 4. Scatters for the position of the synthesis score closest to 0 and for the synthesis score of the position #100 in relation to the number of candidates by editions – scores with EB and master candidates only. Data source: ANPEC.

The most common weights are 20 for all five tests, called “final score with EB”; and, 25 for the results of Macro, Micro, Math and Stat and zero for EB, called “final score without EB”. Once the EB test is less correlated with the others, makes sense to consider scores with and without EB.

There is a relationship between demand (number of applicants) and synthesis score in a certain position in the students’ ranking. To illustrate it, Fig. 4(a) presents a scatter plot between the numbers of master programs candidates and the ranking position of who presented the smallest positive synthesis score with EB. For example, in the 2009 edition there were 723 candidates and the ranking position #292 presented the smallest positive score. In the 2017 edition, when there were 1224 candidates, the ranking position #526 presented the score nearest to zero. This is relevant to observe because usually the tests averages are close to 3, so who maintains these means tends to be a positive score. Consequently, if the demand is around 900 (like in the 2020 edition), this kind of candidate is close to the position #400 in the ranking. Once there are nearly 800 masters vacancies being offered, keeping the average 3 per test is sufficient to be chosen by most programs.

Complementary, Fig. 4(b) is presenting a scatter plot between the numbers of master programs candidates and the synthesis score (with EB) of the candidate in the ranking position #100. The graph shows that when demand falls these candidates differ less from the average. Specifically, when the demand approaches 700 the candidate in position #100 tends to show scores of one standard deviation from the mean; and, when the demand approaches 1200 this same candidate tends to show 1.5 deviations from the average. Since the averages of the crude scores are always around 2 or 3, the graph is showing that higher demand implies greater chances of finding better students – those who know how to answer more items –, which is not surprising.

4.3. Statistics of extremes

Another interesting fact about the exam is that the scores standardization never presents symmetry around zero, and less than half of the final outcomes are positives. Therefore, the results’ densities do not present Gaussian shapes.

The explanation can be found in the statistics of extremes. Specifically, each test has a set \mathcal{M} of all possible fills into the answer sheet, and there is a score function $S : \mathcal{M} \rightarrow \mathbb{R}$. The candidate chooses $m \in \mathcal{M}$ to fill the answer sheet, reflecting in an outcome $S(m)$, whose result is revealed *a posteriori*. Therefore, the choice is based on an expectation $\mathbb{E}(S(m))$. Moreover, it is conditioned on a vector X , representing how much the candidate has studied, if the studied issues actually were among that asked in the test etc. Shortly, the student’s problem is to decide $m^* = \operatorname{argmax}\{\mathbb{E}(S(m) | X) : m \in \mathcal{M}\}$.

Beirlant et al. (2006) show that in this kind of problem usually $S(m^*)$ is a random variable that do not have a Gaussian density, regardless of standardization. In fact, generally it presents one of three probability distributions functions: Gumbel, Fréchet or Weibull. Among them, the only one totally supported in the real number line (like the standardized scores of the ANPEC exam) is the first one, whose density functional form is:

$$f(s) = \frac{1}{\alpha} \exp\left(\frac{\beta - s}{\alpha} - \exp\left(\frac{\beta - s}{\alpha}\right)\right),$$

where $s = S(m^*)$ represents the observed standardized score, $\alpha > 0$ and $-\infty < \beta < +\infty$.

Fig. 5 shows that this theory and the data are adherent. The graphs are presenting in gray lines overlapping smoothed histograms for the standardized individual scores in Macro, Micro, Math, Stat and EB tests and the final score with EB,

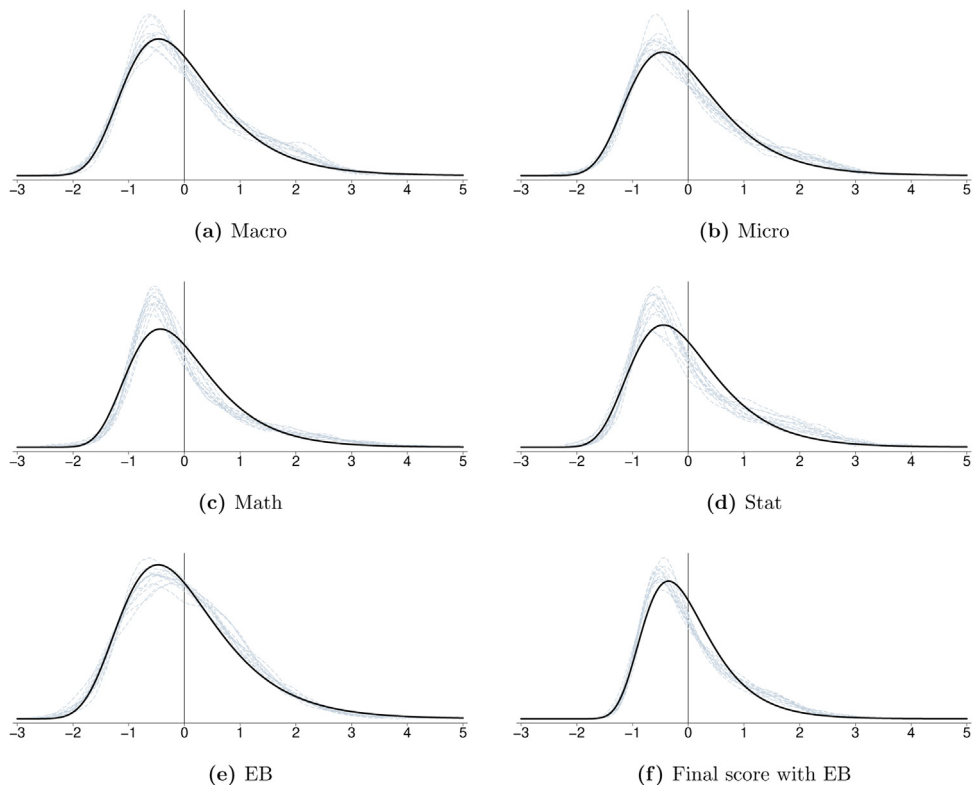


Fig. 5. Smoothed histograms for the standardized scores in gray lines (from 2009 to 2020 editions) and Gumbel distribution plots in black lines. Data source: ANPEC.

from the 2009 to 2020 editions. All numbers are divided by one thousand to be interpreted directly as deviations from the mean. In each graph, the black lines are plotting Gumbel densities, estimating α and β by maximum likelihood. Clearly, the data are well fitted by this theoretical density.

The Gumbel function is right-skewed, and the standardized scores averages (of the exam) are zero by construction. Together, these characteristics imply that the median is always negative, explaining the fact that always less than half of the individual outcomes are positives.

Another curious point comes from the union of some Gumbel's characteristics. First, its theoretical mean is $\gamma\alpha + \beta$, where $\gamma \approx 0.58$ is the Euler–Mascheroni constant. Second, its theoretical variance is $(\pi\beta)^2/6$. Given the scores standardization process, the variances of all exams in all editions converge to one, implying that $\beta \rightarrow \sqrt{6}/\pi \approx 0.78$; which in turn implies that $\alpha \rightarrow -.45$, because means converge to zero. To make a rule of thumb to estimate *a priori* the relationship among demand, outcomes and ranking, it is possible to use these numbers into the quantile function: $\alpha - \beta \ln(-\ln(q))$, for all $0 < q < 1$. Therefore, suppose for example that an exam has one thousand candidates, so theoretically the ranked candidate #1 makes 5 deviations from the mean, the #3 makes 4, the #12 makes 3, the #42 makes 2, the #144 makes 1, the #430 is in the mean, the #868 makes -1 from the mean, the #999 makes -2 and the #1000 makes -3 . Empirically, when the demand is close to one thousand the first one in the ranking makes close to 4 deviations from the mean per test, and the last one usually makes close to -2.5 . Once the numbers seem similar, this rule of thumb allows to have an idea about outcomes and ranking before the tests are applied, just looking at the number of candidates.

Given the Gumbel adjustment, some regressions can be conducted exploring the fact that theoretically the scores are $\gamma\alpha + \beta$ in average, because it is possible to write $\gamma\alpha + \beta_0 + \sum_{j=1}^J \beta_j x_j$, where $X = (x_1, \dots, x_J)' \in \mathbb{R}^J$ is a vector of observed covariates. Naturally, this vector can be the same that was used in the previous econometric exercise.

Table 6 is showing the estimated results for eight regressions, split by: master and doctoral candidates, because the last exercise indicates potential differences between these cases and there are enough observations to consistently

Table 6
 Estimated results for regressions where the dependent variable is the final score in standard deviations. Data source: ANPEC.

Covariate	Master				Doc			
	With EB		Without EB		With EB		Without EB	
	OLS	Gumbel	OLS	Gumbel	OLS	Gumbel	OLS	Gumbel
Age	−0.055*** (0.002)	−0.036*** (0.002)	−0.063*** (0.002)	−0.039*** (0.002)	−0.026*** (0.004)	−0.023*** (0.004)	−0.031*** (0.004)	−0.028*** (0.004)
Man	0.389*** (0.015)	0.255*** (0.011)	0.403*** (0.017)	0.240*** (0.012)	0.293*** (0.030)	0.204*** (0.024)	0.284*** (0.031)	0.204*** (0.025)
White	0.204*** (0.014)	0.124*** (0.011)	0.218*** (0.016)	0.122*** (0.012)	0.113*** (0.029)	0.070*** (0.024)	0.072** (0.031)	0.046* (0.025)
Scholarship	−0.069*** (0.021)	−0.059*** (0.016)	−0.084*** (0.024)	−0.068*** (0.017)	−0.074* (0.044)	−0.071* (0.037)	−0.055 (0.047)	−0.061 (0.037)
Training	−0.053 (0.049)	0.082** (0.037)	−0.016 (0.056)	0.094*** (0.040)	0.337 (0.041)	0.132 (0.206)	0.246 (0.265)	0.144 (0.209)
Doing again	0.180*** (0.016)	0.117*** (0.012)	0.212*** (0.018)	0.128*** (0.013)	0.149*** (0.035)	0.124*** (0.029)	0.136*** (0.037)	0.109*** (0.030)
Public university	0.041** (0.016)	0.086*** (0.013)	−0.029 (0.019)	0.067*** (0.013)	0.044 (0.046)	0.044 (0.038)	0.015 (0.049)	0.041 (0.038)
Single	0.033 (0.053)	0.036 (0.040)	0.063 (0.060)	0.055 (0.043)	−0.005 (0.075)	0.037 (0.062)	−0.011 (0.079)	−0.027 (0.062)
Married	−0.004 (0.056)	0.020 (0.042)	0.020 (0.063)	0.055 (0.045)	−0.011 (0.076)	0.073 (0.063)	−0.032 (0.081)	0.010 (0.063)
Economics	−0.034 (0.023)	0.003 (0.017)	−0.091*** (0.026)	−0.033* (0.018)	−0.044 (0.054)	0.042 (0.045)	−0.127** (0.057)	−0.043 (0.046)
Engineering	0.070*** (0.016)	0.043*** (0.009)	0.088*** (0.019)	0.045*** (0.009)	0.214* (0.118)	0.282*** (0.096)	0.294** (0.125)	0.335*** (0.098)
Business	−0.239*** (0.045)	−0.130*** (0.034)	−0.310*** (0.051)	−0.163*** (0.036)	−0.158 (0.107)	−0.072 (0.089)	−0.230** (0.114)	−0.155* (0.090)
α		0.570*** (0.007)		0.611*** (0.007)		0.405*** (0.022)		0.411*** (0.022)
β_0	0.939*** (0.087)	0.207*** (0.066)	1.194*** (0.098)	0.290*** (0.071)	0.143 (0.156)	−0.190 (0.129)	0.385** (0.165)	0.083 (0.131)
R^2 or pseudo- R^2	0.138	0.087	0.135	0.107	0.138	0.071	0.134	0.107
Observations	12,218				1260			

Standard errors in parentheses, calculated with 50 resampling bootstrap.

* $p < 0.1$.

** $p < 0.05$.

*** $p < 0.01$.

analyze them separately; final standardized scores with and without EB, to check if a different pattern is observed; and, traditional OLS (as benchmark) and the Gumbel model (according to the theory of statistics of extremes). Again, the scores are divided by one thousand to be interpreted directly as deviations from the means, then the estimated parameters can be interpreted as mean marginal impacts in terms of standard deviations.

A first point to note is that the estimated values for the constants (α and β_0) are larger for the master candidates. Given that all mean outcomes are zero, the doctoral candidates tend to have worst scores, regardless of whether the outcomes with/without EB are considered, as the first econometric exercise had already indicated. In the same direction, the results also indicates that a year more in age, which is positively correlated with being a doctoral applicant, also decreases the mean scores.

In fact, all the results of this exercise are pointing in the same direction as before: white men tend to have larger scores, and it also is regardless of whether the results with/without EB are considered; who needs a scholarship usually tend to have smaller scores (and the explanation, of course, may be the same as given above); there is no great difference if the candidate is training; who is repeating the exam tends to be a better outcome; civil status makes no significant

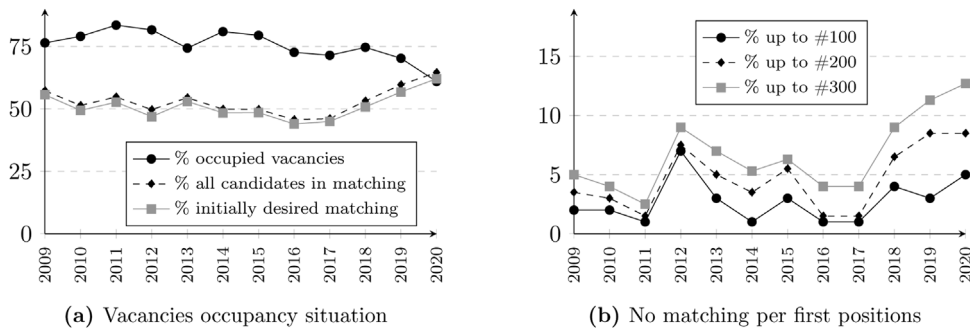


Fig. 6. Vacancies occupancy situation and no matching per first positions in the master programs. Data source: ANPEC.

difference; and, engineers tend to be better than economists in the exam. Above all, this last remark stands out, because it is observed in all specification and econometric technique used.

Finally, the relatively small values of R^2 (in the OLS case) and McFadden's pseudo- R^2 (in the Gumbel case) suggest that the analyzed covariates are able to explain little about the final scores. Consequently, it is likely that there are unobservant variables – e.g., skill and time devoted to the study – with more relevance to determine outcomes.

5. Matching

Given the exam outcomes, a matching electronic system takes place in three rounds of invitations, performed through the ANPEC website. Historically, around of 80% of the cases are solved in the first round; the two subsequent rounds are for residual adjustments. Doctoral programs do not usually use this system, but all the master programs use it – so the focus here is on these last ones.

After receiving an invitation from one or more programs, the candidate responds if accept it; accepted, the applicant is instructed about the program enrollment procedures. Any institution may invite any candidate, even if the person has not chosen the program; and the student can choose any institution too, as long as there is an invitation from it.

The matching data have been stored since 2009, therefore it is not possible to identify whether the possible imbalance between demand and supply (since 2007) affects this process. Anyway, Fig. 6(a) presents the matching/vacancy ratios, where it is noted that around 75% of vacancies have been usually occupied – except for 2020 edition, that presented 60% of occupancy, the smallest recorded. The graph also presents matching/candidate ratios, discriminating against those who enroll in a program that did not choose on the inscription date. With the exception of recent editions, around half of the applicants enroll in some program, and about 2% enroll in a course that was not the initial choice.

An interesting statistic is the number of relatively well-placed candidates – up to #100, #200 and #300 – who do not go to any place, which is illustrated by Fig. 6(b). In the 2020 edition, 12.7% of candidates up to position 300 did not match. Analyzing the data, can be noted that usually these applicants are again on the next year, and with the same programs preferences. Moreover, these candidates commonly choose the eight institutions with more than 4000 indications of interest from the master candidates since the 2009 edition: USP [7336 indications]; FGV-SP [5961]; FGV-RJ [5252]; UFRJ [5084]; UnB [4998]; UNICAMP [4983]; PUC-RJ [4846]; and, CEDEPLAR [4254].

Complementary, Table 7 is showing that on average the best ranked selected candidate of these eight programs – considering the final score with EB, once it is the most utilized – is in the positions number: 4 in PUC-RJ, 5 in FGV-RJ, 7 in USP, 11 in FGV-SP, 21 in UnB, 40 in UFRJ, 51 in UNICAMP and 71 in CEDEPLAR. Unsurprisingly, these most sought institutions select the best ranked candidates. In short, the numbers are suggesting that well-placed candidates without match are only interested in these institutions and are bound to be accepted by some of them, and even if other institutions invite them, they do not accept and prefer to try again in the next edition.

Table 7 also presents [in brackets] averages of the selected candidates position for these most sought institutions and the next ten. A clear observed aspect is a regional hegemony of the institutions outside the southeast region plus Brasília – where there are 27 programs –, in the following sense: PIMES and CAEN have been select the best candidates in

Table 7

Top-ranked candidate position and [in brackets] mean of the selected candidates position, considering the final score with EB, by the 18 programs most indicated by the master candidates. Data source: ANPEC.

Program	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009–2020
PUC-RJ	2 [23]	12 [37]	2 [28]	1 [17]	3 [22]	2 [32]	1 [40]	5 [29]	11 [38]	2 [31]	11 [30]	1 [19]	4 [29]
FGV-RJ	9 [46]	1 [30]	5 [41]	11 [59]	4 [41]	12 [45]	5 [39]	3 [46]	2 [47]	1 [44]	1 [48]	3 [40]	5 [44]
USP	1 [25]	8 [38]	1 [19]	12 [35]	2 [38]	6 [47]	21 [72]	2 [56]	4 [65]	10 [60]	6 [53]	12 [60]	7 [47]
FGV-SP	15 [58]	52 [84]	35 [68]	9 [74]	1 [83]	1 [31]	2 [38]	1 [26]	1 [36]	7 [43]	7 [45]	5 [39]	11 [52]
UnB	27 [87]	28 [112]	61 [101]	5 [91]	23 [110]	10 [84]	3 [100]	22 [92]	8 [75]	30 [117]	27 [108]	4 [93]	21 [97]
UFRJ	6 [100]	34 [112]	34 [109]	65 [126]	51 [135]	57 [150]	34 [153]	64 [188]	48 [197]	41 [234]	2 [219]	49 [207]	40 [161]
UNICAMP	39 [197]	6 [84]	43 [411]	57 [432]	78 [176]	41 [219]	82 [203]	40 [203]	56 [229]	44 [262]	34 [171]	97 [293]	51 [240]
CEDEPLAR	93 [154]	35 [157]	68 [137]	78 [136]	80 [167]	64 [153]	6 [154]	43 [183]	65 [180]	70 [274]	98 [255]	149 [278]	71 [186]
USP-RP	119 [192]	94 [189]	80 [154]	111 [222]	75 [199]	88 [193]	108 [230]	13 [117]	15 [105]	72 [129]	81 [127]	100 [137]	80 [166]
PIMES	54 [233]	56 [217]	31 [239]	74 [248]	129 [246]	77 [260]	154 [279]	79 [324]	183 [363]	183 [595]	160 [383]	183 [324]	114 [309]
UFRGS-EA	92 [216]	122 [275]	152 [265]	135 [241]	100 [218]	61 [224]	159 [265]	110 [237]	126 [230]	77 [195]	168 [291]	199 [260]	125 [243]
CAEN	106 [352]	126 [388]	112 [389]	127 [409]	125 [443]	97 [516]	57 [509]	111 [502]	141 [515]	181 [384]	214 [410]	103 [443]	125 [438]
ESALQ	86 [231]	62 [246]	163 [385]	83 [476]	117 [414]	165 [578]	128 [471]	249 [526]	174 [591]	158 [462]	190 [481]	273 [602]	154 [455]
UCB	60 [222]	171 [403]	175 [443]	171 [427]	192 [499]	260 [384]	50 [464]	204 [422]	144 [346]	85 [395]	191 [320]	188 [274]	158 [383]
UFPR	238 [346]	131 [311]	126 [330]	191 [392]	135 [344]	196 [368]	81 [235]	131 [226]	148 [278]	189 [314]	225 [413]	287 [430]	173 [332]
UFJF	237 [268]	259 [377]	159 [343]	126 [250]	87 [306]	146 [419]	185 [421]	199 [431]	193 [373]	194 [377]	123 [347]	174 [432]	174 [362]
UFSC	251 [383]	202 [397]	140 [410]	265 [446]	186 [367]	210 [484]	250 [378]	142 [424]	170 [266]	8 [251]	194 [335]	167 [289]	182 [369]
UFRGS-ED	176 [310]	160 [313]	242 [375]	169 [305]	229 [284]	74 [314]	229 [265]	270 [423]	300 [462]	342 [530]	180 [431]	101 [448]	206 [372]

the Northeast, whereas there are 10 programs; and, UFRGS (booth fields), UFPR and UFSC have been select the best candidates in the South, whereas there are 13 programs.

Migration is another important aspect to observe in the matching process, since it is a national selection system. In this sense, [Table 8](#) is showing in the lines the origin (in terms of home address) of the 6376 applicants that have matched since 2009, and in the columns the destination, by federation units. The diagonal bold numbers highlight the number of applicants who are selected and do not leave their home states, that represent 2/3 of the matching cases. Another curiosity that can be observed is that other 2/3 of the master students are from (and go to) São Paulo, Rio de Janeiro, Minas Gerais and Paraná.

Table 8

Origin and destination of the candidates from 2009 to 2020 editions, by federation units. Data source: ANPEC.

Origin	Destination												Total
	SP	RJ	MG	PR	RS	DF	PE	CE	BA	ES	SC	Other	
SP	1168	142	84	68	47	25	4	2	4	8	32	10	1594
RJ	94	786	83	14	36	11	6	8	7	30	13	11	1099
MG	102	46	456	40	45	9	7	6	14	25	21	15	786
PR	38	14	10	326	16	4	3	1	5	2	14	5	438
RS	35	22	13	15	278	4	11	5	2	6	12	9	412
DF	45	63	20	18	8	253	8	1	3	4	12	11	446
PE	15	6	5	2	7	1	197	1	1		1	76	310
CE	12	10	15	3	13	2	10	147	1	2	2	40	257
BA	11	5	9	4	16	5	14	1	136			28	229
ES	13	10	4	4	8	3	1			89	1	1	134
SC	10	5	6	18	21	3	2	1	3	4	73	5	151
Other	52	12	43	32	39	13	37	4	16	9	7	255	519
Total	1595	1121	748	544	534	333	300	177	192	179	188	466	6376

6. Final remarks

This paper presented a contemporary picture of the Brazilian academic economics, from the ANPEC exam microdata in recent years. The main feature noted is that academic master's courses demand and supply are numerically closer since 2007.

The demand has presented a historical upward trend, with a significant variance. Therefore, a future investigation about the reasons for this oscillation seems relevant for the academic economics maintenance in Brazil. A simple way to start this can be expanding the questionnaire filled by candidates at the exam registration, because students' motivations and expectations are ambiguous – i.e., nowadays there is no inquiry about what makes a person sign up for the graduate courses.

Specifically, it is suggested to introduce a question such as “in few words, tell to the programs (that you are subscribing) why have you decided to apply for a master/doctor's degree?”. Given that the application is online, the student needs to type this text, so it would be easy to identify keywords like “scholarship”, “public job”, “professor” etc. In this way, it would be possible to map motivations to know if the students' expectations are in line with the programs' proposals.

On the supply side, the hypothesis raised here is that REUNI caused much of its expansion. In this case, the trend of increasing vacancies should not be maintained, since the policy no longer exists and the federal universities budgets are being reduced. This indicates that it is more important to study the demand, because eventual unbalances probably will come from this side.

Another consequence of these unbalances may be more competition among programs to recruit better students, because the occupancy rate of the vacancies offered has decreased in recent years in many courses – and this, at the very least, can compromise the CAPES's assessments. Therefore, there is a sign that many programs need to be rethought to stand out from the rest, perhaps adjusting their pedagogical projects to address local realities, more applied themes etc.

Finally, another topic for future research is to understand how far the exam actually reveals good students. Possibly, this can be done by corresponding the microdata analyzed here with the grades (and dropout rates) of these students over the course where enrolled. Because may be the best ranked candidates in the exam be in fact very well prepared, but after a given position in the ranking (e.g., #300) everyone may be very similar *a posteriori*.

References

- Azzoni, C.R., 2000. Desempenho das revistas e dos departamentos de economia brasileiros segundo publicações e citações recebidas no Brasil. *Econ. Apl.* 4 (4), 786–822.
- Barbosa, M.P., Petterini, F.C., Ferreira, R.T., 2019. Política de Expansão das Universidades Federais: É Possível Potencializar os Impactos Econômicos? *Rev. Adm. Contemp.* 24 (1), 1–24.

- Beirlant, J., Goegebeur, Y., Segers, J., Teugels, J.L., 2006. *Statistics of Extremes: Theory and Applications*. John Wiley & Sons.
- Cameron, A.C., Trivedi, P.K., 2005. *Microeconometrics: Methods and Applications*. Cambridge University Press.
- Colander, D., Klamer, A., 1987. The making of an economist. *J. Econ. Perspect.* 1 (2), 95–111.
- Faria, J.R., 2000. The research output of academic economists in Brazil. *Econ. Apl.* 1 (4), 11–95.
- Faria, J.R., 2009. Most cited articles published in Brazilian journals of economics: Google Scholar rankings. *EconomiA* 11 (1), 1–25.
- Fernández, R.G., Suprinyak, C.E., 2018. Creating Academic Economics in Brazil: the Ford Foundation and the beginnings of ANPEC. *EconomiA* 19 (3), 314–329.
- Haddad, E.A., Mena-Chalco, J.P., Sidone, O., 2017. Produção científica e redes de colaboração dos docentes vinculados aos programas de pós-graduação em Economia no Brasil. *Estud. Econ.* 47 (4), 617–679.
- Haddad, P.R., 1981. Brazil: economists in a bureaucratic-authoritarian system. *Hist. Polit. Econ.* 13 (3), 656–680.
- Klamer, A., 2014. *The Culture of Academic Economics*. Cambridge University Press, Cambridge.
- Krueger, A.O., 1991. Report of the commission on graduate education in economics. *J. Econ. Lit.* 29 (3), 1035–1053.
- Leontief, W., 1982. Academic economics. *Science* 217 (4555), 104–107.
- Loureiro, M.R., 1997. The professional and political impacts of the internationalization of economics in Brazil. *Hist. Polit. Econ.* 28, 184–210.
- Sidone, O.J.G., Haddad, E.A., Mena-Chalco, J.P., 2017. Scholarly publication and collaboration in Brazil: the role of geography. *J. Assoc. Inf. Sci. Technol.* 68 (1), 243–258.
- Silva, C.A.T., Brito, A.M., Faria, J.L.F., 2018. Valor pago por aluno adicional nas universidades federais brasileiras com o programa Reuni. *Rev. CGU* 10 (16), 738–760.
- Versiani, F.R., 1997. A ANPEC aos 25 anos: passado e futuro. *Rev. ANPEC* 1 (1), 219–259.