Gender gaps in low and high-stakes assessments

FABIANA ROCHA
PAULA PEREDA
MARIA DOLORES MONTOYA DIAZ
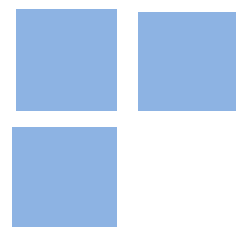**GABRIEL FACUNDES MONETIRO**
LUIZA KARPAVICIUS
LIZ MATSUNAGA
BRUNA BORGES
CLARA BRENCK

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Fabiana Rocha (frocha@usp.br)
Paula Pereda (pereda@usp.br)
Maria Dolores Montoya Diaz (madmdiaz@usp.br)
Gabriel Facundes Monteiro (gabrielfmonteiro1@gmail.com)
Luiza Karpavicius (luiza.karpavicius@envs.au.dk)
Liz Matsunaga (liz.mtn@gmail.com)
Bruna Borges (brupugialli@gmail.com)
Clara Brenck (clara.brenck@newschool.edu)

Research Group: EconomistAs – Brazilian Women in Economics

Abstract:

A comprehensive body of literature suggests that women do not perform as well as men in competitive settings. In this paper, we use individual-level administrative data to investigate if women and men respond differently to exam stakes in Brazil. We compare performances of students at the University of São Paulo in undergraduate Economics courses (low stakes) and in the national admission exam to Economics graduate programs (high stakes). We find evidence that women outperform men in undergraduate disciplines but underperform on the graduate admission exam. Our study indicates that there are indeed gender differences in low and high-stakes evaluations.

Keywords: Gender; High-stakes assessments; Graduate admissions; Higher education

JEL Codes: I23; J16

Gender gaps in low and high-stakes assessments[*]

Fabiana Rocha [†]   Paula Pereda [‡]   Maria Dolores Montoya Diaz [§]

Gabriel Facundes Monteiro [¶]   Luiza Karpavicius [‖]

Liz Matsunaga [**]   Bruna Borges [††]   Clara Brenck [‡‡]

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Abstract

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[†]Department of Economics, University of São Paulo - FEA/USP. E-mail: frocha@usp.br.

[‡]Department of Economics, University of São Paulo - FEA/USP. E-mail: pereda@usp.br

[§]Department of Economics, University of São Paulo - FEA/USP. E-mail: madmdiaz@usp.br

[¶]Department of Economics, University of São Paulo. E-mail: gabrielfmonteiro1@gmail.com

[‖]Department of Environmental Science, Aarhus University. E-mail: luiza.karpavicius@envs.au.dk

[**]Department of Economics, University of São Paulo - FEA/USP. E-mail:liz.mtn@gmail.com

[††]Instituto Unibanco. E-mail: brupugialli@gmail.com

[‡‡]Department of Economics, The New School. E-mail: clara.brenck@newschool.edu

1 Introduction

There is significant evidence suggesting that women do not perform as well as men in competitive situations (Gneezy and Nierdele, 2003; Nierdele and Vesterlund, 2011). In addition, many studies suggest that women's academic under-performance is even more prominent when competition and the stakes are higher (Jurajda and Münich, 2011; Ors et al., 2013; Azmat et al., 2016; Cai et al., 2019; Borges et al., 2021; Saygin and Atwater, 2021; Hvidman and Sievertsen, 2021). The literature focuses mostly on academic performance and evaluates if the nature of the tests or the tests setting affects the relative gender performance. The main aspects of the tests are their competitiveness, the level of stakes involved, and their grading scheme.

This paper seeks to contribute to this growing literature by using real-life stakes from a developing country. We use individual-level data to compare the students' performance in two different situations. First, when students are undergraduates in Economics and we observe their grades in exams of different disciplines. These exams are considered low-stakes since they are pass or fail types of assessments and are not useful for getting a job or being admitted to a graduate program. Second, when they take the unified national Master's entrance exam and we observe their grades in the national exam. Here the stakes are high, as the exam is very competitive in the sense that candidates compete for a limited number of places. To illustrate, to be accepted by one of the "top 4" institutions, the candidate must be among the 80 best-ranked out of more than 1,000. The stakes are also higher as attending a top master's program impacts students' career perspectives (Estevan and Santos, 2022).[1]

To evaluate low-stakes exams' performance, we use administrative records for economics students in one of the most important universities in Latin America, the University of São Paulo (USP) in Brazil. Our database contains grades obtained by 2,606 students from 2000 to 2012. In Brazil, students apply to college and major at the same time.[2] The undergraduate at USP is highly specialized in economics, not a mix of economics and business. Students have no discretion over which disciplines to attend in the first year and are automatically enrolled in a limited number of mandatory disciplines. As the coursework structure is relatively rigid, students only have more freedom to choose which disciplines to attend in the two final years of the program.

We then follow USP former students and verify their performance in the national admissions exam for graduate programs in Economics to investigate performance in high-stakes exams. As they were exposed to the same higher education program, after controlling for other observable characteristics, differences in performance can be expected to be mostly due to gender differences[3]. The exam is known as ANPEC exam since the National Association of Postgraduate Programs in Economics (*Associação Nacional dos Centros de Pós-Graduação em Economia - ANPEC* is responsible for running the exam. ANPEC data allow us to estimate gender impacts by

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[1]Estevan and Santos (2022) show that the top 4 institutions account for 76.4% of Ph.D. placements abroad.

[2]Students can transfer to a different major once admitted. However, transfers are rare and not straightforward. In our database, there were found 220 internal (176) and external (44) transfer students cases.

[3]In Rocha et al. (2021) we present the hypothesis that the "leakage in the pipeline" of economics career seems to begin in this exam.

expanding the set of controls from characteristics observed in the USP's administrative sample.[4]

ANPEC exam is the only route to admission into prestigious Master's programs in Economics in Brazil. [5] A distinctive characteristic of the exam is that the questions are mainly true or false, where wrong answers are penalized (they yield negative points). Omissions are not penalized and yield zero points. There is, therefore, a clear strategic component involved in the exam. Students believe that the university they choose to take their Master's will make a huge difference in their future, so they put a lot of pressure on themselves to perform well in the exam[6] . The rewards might come not only in the form of greater job opportunities and better-paid jobs but also in more Ph.D. placements abroad (Estevan and Santos, 2022). Professors at the best universities, in general, have better networks. These universities also have a better reputation abroad since they have a history of sending students to the best Ph.D. programs. Many of the students that follow this track become professors at high-level American and European universities. Therefore, there is a general belief that the best way to start an academic career is to obtain a Master's degree from one of the "top 4" universities[7]

Our findings show that women perform better than men in most undergraduate disciplines (in terms of grades and approval rates), regardless of the economics field. When we look at a more granular level, we find that men achieve higher grades than women only in Finance disciplines. In contrast, women outperform their male counterparts in Econometrics, History, Introductory courses, Mathematics, and Social Sciences. When we analyze the ANPEC exam, where the stakes are higher, women have a lower probability of ranking among the top 50 students.

Our paper contributes to the recent literature that evaluates whether female and male students respond differently to test stakes. Jurajda and Münich (2011) finds that women perform worse than men in academic examinations with high future payoffs. This result appears again in Ors et al. (2013) for HEC Paris admission exam (high stakes) compared to the end of high school exam and first-year undergraduate courses (lower stakes); Azmat et al. (2016) for schools exams in Barcelona with different stakes and Cai et al. (2019) for a mock and the actual national college entrance exam in a province in China - Gaokao exam. For Brazil, Borges et al. (2021), using data from a prestigious university - State University of Campinas (Unicamp), show that females' performance decreases (relative to males) when stakes increase. They also find evidence that the decrease is larger for the candidates with higher ability. It is not an easy task to determine the mechanisms through which this gender differences appear. Gender differences in perfectionism

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[4]Both datasets are not publicly available and were obtained by the research group after requesting and signing a confidentiality agreement.

[5]Some Ph.D. programs also require the ANPEC exam, but selection involves other criteria such as a statement of purpose and/or research project.

[6]Petterini (2020) brought evidence that candidates commonly show interest in eight institutions. Each of them received more than 4,000 indications of interest since 2009, with USP receiving the highest number of indications (7,336), 23% higher than the second institution. Additionally, Petterini (2020) showed that on average, the best ranked selected applicants of these eight programs are 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.

[7]Santos (2020) found evidence that the chances of entering a doctoral program are greater only for students classified up to 15th place in the ANPEC exam, for the other students (up to 250th position), the probability is the same regardless of attending a more selective or less selective university.

and self-confidence seem to be potential mechanisms that explain men outperforming women in higher-stakes exams.

Our paper also relates to the evidence on gender differences in attitudes towards risk and competitiveness. Regarding risk, and in a context similar to ours[8], Pekkarinen (2015) shows that in Finland women perform worse than men in the admission exam and are less likely to be accepted at universities. Women also omit more items than men, and as a consequence, they deviate more from the number of items that would maximize the probability of being accepted. Saygin and Atwater (2021), using administrative data from Turkish College Admissions, find that female test-takers skip significantly more questions than male test-takers in the quantitative track. They also show that self-assessment is related to skipping behavior and could partially explain the gender gap. The authors argue that male test-takers are more likely than female test-takers to report that they are good at Math, Science, and Social Sciences after conditioning on their number of correct answers in the corresponding test sections. Regarding competitiveness, Nierdele and Vesterlund (2007) show that women (men) seek to avoid (embrace) competitive situations and claim that this difference in behavior is due to lower female expectations about performance. Dohmen and Falk (2011), on the other hand, attributed this difference to gender differences in the attitudes towards risk.

Finally, we add to the literature that examine gender differences in the performance of undergraduate students in economics. For example, Rask and Tiefenthaler (2008) find evidence that female students attain a higher overall economics GPA than male students and that male students dominate the bottom of the grade distribution. Beneito et al. (2018) find that men outperform women in macroeconomics, while women outperform men in microeconomics. The differences are larger in the upper tail of the grades distribution.

The remainder of this article is organized into five sections, in addition to this introduction. Section 2 provides institutional background on undergraduate and graduate programs in Economics in Brazil. Section 3 describes the data and the empirical strategy, while Section 4 presents and discusses ANPEC exam data and the empirical results. Finally, section 5 summarizes the main conclusions of our work.

2   Institutional background

Public universities represent almost one-quarter of all tertiary students in Brazil in 2019.[9] Besides being renowned institutions in Brazil, public universities do not charge tuition or other fees. Due to that, they tend to be preferred choices among high-school students, and their admission process is highly competitive (Borges and Estevan, 2021). The University of São

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[8]In Finland, entrance exams for economics and business in universities involve multiple-choice tests where wrong answers are penalized with negative points while omissions yield zero points

[9]Public universities can be funded by federal, state, or municipal governments. Data available in https://download.inep.gov.br/educacao_superior/censo_superior/documentos/2020/Apresen-tacao_Censo_da_Educacao_Superior_2019.pdf.

Paulo (USP), where our empirical study concerning undergraduate students' performance is set, is a research-intensive state university with ten campi in the state of São Paulo. It is the largest university in Brazil. In 2012, it offered 246 undergraduate and 229 graduate courses, and had 5.8 thousand professors and 93 thousand students (undergraduate and graduate). The main campus is located in one of the wealthiest city in the country, São Paulo.[10]

According to the Times Higher Education Latin America University Rankings 2020, USP is the second-best university in the Latin America and Caribbean region, just behind the Pontifical Catholic University of Chile (PUC-Chile). [11] The 2020 ranking includes 166 universities across 13 countries. According to the SCIMAGO Institutions Rankings 2020, USP occupies the 61st position among 500 international institutions.[12]

During our period of analysis (admission years from 2000 to 2012), the admission system used by USP was the "vestibular" or "FUVEST"[13], a decentralized university-specific entrance exam in which students also choose the major they are applying for beforehand[14]. The FUVEST is held once a year and has two phases, the first one in November/December and the second in January. The first phase involves only multiple-choice questions. If the student reaches a score higher than the minimum required to be accepted in his/her field of interest, he/she goes to the second phase, which involves only open questions. The final score is composed of scores in both phases, so it is important to perform well throughout the exams.

The undergraduate program in economics at USP offers 180 places, half of them in the daytime stream and the other half in the evening stream. When students register to take FUVEST, they indicate whether they want to attend daytime or evening disciplines. The coursework is the same in both streams, but the evening stream is longer since they have fewer disciplines per semester.[15] The best-ranked students are invited to enroll in the first admission list up to the number of available slots. After that, additional admission lists are published until there are no more remaining places. Classes usually start in February. A critical aspect of the exam is that the student can attend only one field of study. Therefore, they can apply and enroll at the university sequentially, but not concurrently (Borges and Estevan, 2021). Our database is from the main campus, and from now on, every time we refer to USP, we mean the São Paulo city campus.

Unlike most American universities, the coursework structure in economics is rigid, and about 57% of credits are in mandatory courses (Borges and Estevan, 2021). The undergraduate program is highly specialized in economics, and as such, it does not have business-related disciplines

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[10]The main campus called "Cidade Universitária Armando de Salles Oliveira" or simply "Cidade Universitária".

[11]The ranking is based on the same 13 performance indicators as the Times Higher Education World University Rankings but uses different weights to reflect the specific characteristics of the regions' universities.

[12]Research and Innovation Rankings 2020 www.scimagoir.com, March 20, 2021.

[13](The name FUVEST is the acronym for *Fundação Universitária para o Vestibular*, the foundation in charge to elaborate the questions, apply and correct the exams).

[14]Since 2015, the students interested in attending an undergraduate program at USP can also use their score in a centralized standardized exam called ENEM.

[15]As in other Brazilian universities, it is not uncommon for students to work during their undergraduate studies, either in internships or regular jobs. They typically work for consulting firms, banks and in the financial system in general, research institutions and the government, in occupations closely related to their future careers (Borges and Estevan, 2021). This is one reason why evening courses are also offered by the universities.

as core courses. Besides, students must pass introductory disciplines to take more advanced ones, implying that students typically follow classes with their admission cohorts. If they fail one class, they will take longer to graduate. Students also have to write a bachelor thesis under a professor's supervision to graduate. Daytime and evening students are split into two disciplines per stream. There are two classrooms in the morning and evening, each with around 45 students attending parallel classes during the first semester. Conditional on the stream, the assignment criterion of students to each of the classrooms follows an alphabetical order, mimicking a random assignment (Scoppa and Paola, 2010).[16] After the first semester, the students' composition in each classroom remains similar, but there is some change because some students fail the mandatory courses. Later in the course, the classrooms are more mixed because most of the courses are not mandatory.

Students who want to continue their studies in Economics (therefore, in the graduate track) must take the ANPEC exam. The exam takes place once a year, usually in September, and it is a compound of tests in microeconomics, macroeconomics, mathematics, statistics, Brazilian economy, and English. All the students take the same exams at the same time. Each candidate scores a total number of points on each test, and these scores are standardized. Then ANPEC releases a ranking of candidates based on these standardized scores. All tests are equally weighted in this official ANPEC ranking, except the English test, which no institution uses as an admission criterion. However, each university can choose its weights and ranking to select students. The "top 4" institutions consider only microeconomics, macroeconomics, mathematics, and statistics – which we refer to as the core exams – and apply the same weight to the four tests.[17]

Two aspects of the exam deserve special attention. The first one is a strategic component involved in the exam itself. The questions are mainly true or false, where wrong answers are penalized because they yield negative points. More precisely, an incorrect answer yields the negative of the same amount of points as a correct answer would. Omissions are not penalized and yield zero points. There are a few open questions (around 20% of the exam) for which there is no penalty. This scoring rule implies that the number of omitted questions will affect the probability of entry.

The second one is the admission procedure: when registering for the exam, candidates submit a list containing a maximum of six desired universities without an order of priority. After the exam results are released, universities have one week to contact the candidates and make them an offer. Every applicant who has received an offer must complete a form where he/she indicates a "definite" or "conditional" acceptance. If the candidate chooses for definite acceptance, the process ends, and he/she will no longer receive offers from other universities. If the candidate chooses conditional acceptance, he/she will temporarily choose the university inviting him/her,

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[16]Borges and Estevan (2021) explore the exogenous assignment of students to classes at the Department of Economics from USP to estimate female peers effects and professors' effects on labor market and educational outcomes.

[17]The "top 4" institutions are Fundação Getúlio Vargas São Paulo (FGV-EESP), Fundação Getúlio Vargas Rio de Janeiro (FGV-EPGE), Pontífica Universidade Católica do Rio de Janeiro (PUC-RIO), and Universidade de São Paulo (IPE-USP).

but at the same time will also reveal whether he/she would instead go to another university and is still hoping to be accepted. After this first round, the second round starts, and the candidates can still choose between "definite" or "conditional" acceptance. In the third and final round, it is only possible to accept definitively.

Most of the best-ranked candidates want to go to the most prestigious graduate programs, and the most prestigious programs also want to be chosen by them. Along with the three rounds, the universities advertise themselves, showing the qualities of their programs and the future career perspectives their programs can provide. To illustrate how competitive the process is, to be accepted by one of the "top 4" institutions, the candidate must be among the 80 best-ranked candidates out of more than 1,000 applicants.

3 Undergraduate performance

3.1 Data

We first investigate student-level data from the Economics, Business, and Accounting School of the University of São Paulo (FEA-USP), who were admitted from 2000 to 2012. We received the anonymous data collected from the academic record system of undergraduate students at USP[18]. It contains information about the students' age, type of admission, placement in FUVEST, attendance, grades, and final result (approved or failed) of each class. During the period 2000-2012, the admission years considered in our analysis, 2,606 students were admitted into the undergraduate economics program (23.3% of female students). [19]

We then construct a panel of student-discipline from 2000 to 2016 that comprises 112,620 observations, in which each observation is the student's performance in a discipline. The grades by discipline can be considered as coming from low-stakes exams since they are used to be approved in the discipline, and students have many exams, exercises, and activities that comprise the final grade.

In Table 1, we present some comparisons between man and women. The groups are statistically different in age at admission (in years) and degree completion rates. Women are younger when they start college and complete the courses (and thus receive the bachelor's degree) more often. There are no significant differences in the percentage admitted through FUVEST, in FUVEST's ranking[20], place of birth (state of São Paulo or city of São Paulo), or time to graduate.

We restrict our sample to the students who completed the course (graduated at USP) and the students admitted via the FUVEST exam.[21] After exclusions, we keep 1,685 students (64.66%)

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[18]The system is called JupiterWeb platform.

[19]This number does not include 11 cases of double admissions, i.e., the same person being admitted at least twice into Economics at FEA-USP during the period.

[20]We also found no statistically significant gender differences in the percentage in the top 25 and top 50 FUVEST ranking positions, but it appears in the top 100 - see table A.1 in the Appendix.

[21]We also remove 11 students from our sample that are double-counted. These cases consist of students that were admitted twice at USP at different periods in time.

Table 1 – Gender differences of students' characteristics, Economics at FEA-USP, students admitted from 2000 to 2012

Variable	Men	Women	Diff.
Age at the time of admission (years)	19.89	18.93	-0.96 ***
% students admitted via FUVEST admission exam	90.84	90.95	0.11
Student's FUVEST Ranking	113.79	117.48	3.69
% students from Sao Paulo (State)	97.71	97.94	0.23
% students from Sao Paulo (City)	77.29	79.68	2.39
Degree completion rates	68.42	79.37	10.95 ***
Time to graduate (in years)	4.27	4.21	-0.05

Notes: Diff. refers to differences in the averages by gender: Diff. = $(\bar{x}_{Women} - \bar{x}_{Men})$. Student's FUVEST Ranking is conditional on being admitted at FEA-USP. P-values: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

from the original sample.

To analyze the student performance, we organize the disciplines into categories. First, we group them into eight subcategories: Introduction to Economics, Econometrics, Mathematics, Finance, History, Macroeconomics, Microeconomics, Social sciences, and Graduation paper (Bachelor's Thesis). After that, we aggregate the disciplines into three broader categories called "Humanities", "Quantitative", and "Other" disciplines. Appendix Table A.2 shows the classification of the 32 mandatory disciplines. Furthermore, in Table 2 we see that 52% of all disciplines offered are classified as Quantitative, while 66% of the mandatory disciplines are classified as Quantitative, highlighting the extensive math requirement of the course.

Table 2 – Number of disciplines in the Economics course of FEA/USP, all and mandatory

	Mandatory		All	
Classification	*Number of Disciplines*	*%*	*Number of Disciplines*	*%*
Quantitative	21	66%	81	52%
Humanities	9	28%	32	21%
Other	2	6%	43	28%
Total	32		156	

Notes: The full classification of the disciplines is shown in Appendix Table A.2.

To make grades comparable among students, we focus on the mandatory disciplines. We base our decision on a possible selection bias in elective disciplines that occurs through gender differences.[22] Table 3 shows that women have on average higher grades (grades vary from 0 to 10) than men on mandatory disciplines, more specifically a difference of 0.09 grade points in Quantitative disciplines, 0.24 in Humanities classes, and 0.38 in Other disciplines.

We then compare the grades of each subcategory in Table 4. We again observe that women outperform men in all fields of Economics, except for Macroeconomics and Microeconomics, where there is no evidence of gender differences in performance, and Finance, where male students outperform their female counterparts.

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[22] Rocha et al. (2021) shows that there are significant difference in research areas between women and men in Economics.

Table 3 – Average final grade and total observations per mandatory discipline by category and gender

Category of subjects		Men	Women	Difference
Quantitative	Grade	6.39	6.48	0.09 ***
	Obs.	20,046	7,123	
Humanities	Grade	6.39	6.63	0.24 ***
	Obs.	9,045	3,247	
Other	Grade	6.48	6.86	0.38 **
	Obs.	1,413	486	
Total	Grade	6.39	6.54	0.15 ***
	Obs.	30,504	10,856	

Notes: Sample of students admitted via FUVEST exam from 2000 to 2012. We consider the grades obtained in mandatory disciplines. Grades vary from 0 to 10. P-values:*p<0.1; **p<0.05; ***p<0.01.

Table 4 – Average final grade and total observations per mandatory discipline by subcategory and gender

Subcategory of subjects		Men	Women	Difference
Econometrics	Grade	6.07	6.29	0.22 ***
	Obs.	7,051	2,449	
Finance	Grade	6.89	6.45	-0.44 ***
	Obs.	538	207	
History	Grade	5.96	6.17	0.21 ***
	Obs.	6,529	2,325	
Introduction	Grade	7.45	7.59	0.14 ***
	Obs.	3,212	1,151	
Macro	Grade	6.37	6.38	0
	Obs.	4,752	1,735	
Math	Grade	6.64	6.83	0.18 ***
	Obs.	3,046	1,107	
Micro	Grade	6.10	6.12	0.02
	Obs.	4,720	1,696	
Graduation Thesis	Grade	6.60	6.92	0.32 **
	Obs.	1,822	632	
Social Sciences	Grade	7.07	7.26	0.19 **
	Obs.	1,523	554	

Notes: Sample of students admitted via FUVEST exam from 2000 to 2012. We consider the grades obtained in mandatory disciplines. Grades vary from 0 to 10. P-values:*p<0.1; **p<0.05; ***p<0.01.

3.2 Empirical analysis

Using the panel of student-discipline over time, we evaluate gender differences in the performance of undergraduate economics students by controlling for a set of observable characteristics of the students and non-observable of the disciplines. We estimate the following regression model:

$$y_{icdt} = \beta_0 + \beta_1 women_i + \delta_{ct} + \gamma_{t*} + \theta' X_i + \epsilon_{icdt} \tag{1}$$

where y_{icd} are the final grades (0-10), obtained by student i in year t (admitted in $t*$) in the discipline d in class c. $women_i$ is a dummy variable equal to 1 if the student is a woman and 0 if the student is a man. δ_{ct} is the classroom-year fixed effect, in which the class corresponds to a class in which student i took discipline d (determined by the year and semester). γ_{t*} is the fixed effect of the year of entry. X_i is a matrix of control variables for student i, such as age, the classification of student i in the FUVEST exam; city of origin is São Paulo, and an indicator variable if the student was approved in the first call of admission of FUVEST. We also conduct an additional exercise where the dependent variable y_{icdt} is a dummy variable equal to 1 if the student was approved in the subject and 0 otherwise. For the latter, we run a probit model and report the estimated average marginal effects.

Our sample is a panel of undergraduate students' grades (and approval rate) from 2000 to 2016. These students were admitted from 2000 to 2012 via the FUVEST exam. We look at the grades at different levels: average grades, grades in Humanities disciplines and in Quantitative disciplines and grades in specific disciplines (Introduction to Economics, Econometrics, Mathematics, Finance, History, Macroeconomics, Microeconomics, Social Sciences, and Graduation paper)[23].

Table 5 present the results for average grades and approval rates. Columns (4) and (8) relate to the complete specification with the admission year fixed effects, classroom-year fixed effects, and inclusion of all control variables. Regardless of the specification, we find female students have on average higher grades than male students, although the magnitude of the difference is relatively small. Women's approval rate is also higher in all specifications. These results are in line with our descriptive statistics.

The directions of the control variables are also noteworthy. In columns (4) and (8), of Table 5, we observe that, on average, students who had a higher classification rank at FUVEST (had a worse performance in the admission exam) have lower grades in undergraduate courses, which is intuitively expected. The correlation is negative for age, being from the city of Sao Paulo, and having entered the university in the first 'call' list.

We then investigate the gender differences in grade by discipline to check if women and men specialize differently in undergraduate. The results for Humanities and Quantitative and by discipline (Introduction, Econometrics, Finance, History, Macroeconomics, Microeconomics, Social Sciences and Thesis) are in Tables 6, 7 and 8. We consider only students who concluded the degree and only mandatory subjects (as there may be a selection bias in the elective subjects

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[23]Appendix Table A.3 presents the complete list of disciplines in each category.

Table 5 – Gender differences in final grade and approval rate, mandatory disciplines

	Average Grade				Approval Rate			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Women	0.140***	0.131***	0.086***	0.112***	0.018***	0.017***	0.011***	0.011***
	(0.025)	(0.026)	(0.025)	(0.025)	(0.003)	(0.004)	(0.003)	(0.003)
FUVEST Ranking				−0.004***				−0.0002***
				(0.0003)				(0.00003)
Age				−0.033***				−0.003***
				(0.006)				(0.001)
Sao Paulo (city)				−0.001*				−0.00002
				(0.0004)				(0.00004)
First Call List				−0.168***				−0.011***
				(0.031)				(0.004)
Year of entry FE		X	X	X		X	X	X
Class FE		X	X	X			X	X
Control Variables				X				X
Observations	44,939	44,939	44,939	44,939	44,939	44,939	44,939	44,939

Notes: The sample is a panel of undergraduate students' grades from 2000 to 2016. These students were admitted from 2000 to 2012 via FUVEST exam and concluded the course. Columns (1)-(4) present the estimates for average final grade as the dependent variable, columns (5)-(8) show the probit average marginal effects estimates for the approval rate. Columns (4) and (8) relate to the complete specification with the year of entry fixed effects, classroom fixed effects, and inclusion of all control variables, respectively. Standard-errors are clustered at the classroom level. P-values:*p<0.1; **p<0.05; ***p<0.01.

through gender difference). According to Table 6, female students perform better than men in Humanities disciplines and Quantitative disciplines, although in a smaller magnitude. Regardless of the disciplines types, women are approved at a higher rate than men.

Tables 7 and 8 report the results for final grades and approval rates by discipline. First, in Table 7, we observe that, when controlling for all variables and fixed effects, women have higher grades than men in Econometrics, History, Introduction, Mathematics, and Social Sciences. Conversely, men have higher grades in Finance. There are no statistically significant gender differences in grades for Macroeconomics, Microeconomics, and Graduation paper disciplines.

Table 8 presents the differences in approval rates per discipline type. After including all our control variables and fixed effects, we see significant differences only in Econometrics and History subjects, where women are approved more often than their male counterparts.

Our evidence on gender differences in academic performance partly confirms results from previous studies. For instance, Beneito et al. (2018) show that women have different preferences for topics of research relative to men and try to analyze if these differences are settled down when they take their undergraduate courses. Using administrative data from the University of Valencia, Spain, they find that men outperform women in macroeconomics while women outperform men in microeconomics. The differences are larger in the upper tail of the grades distribution. Using survey data, they also can conclude that the economics profession is perceived by the students as

Table 6 – Gender differences in final grade and approval rate, mandatory subjects per category

	Final Grade			Approval Rate		
	Quantitative	Humanities	Other	Quantitative	Humanities	Other
	(1)	(2)	(3)	(4)	(5)	(6)
Women	0.048*	0.214***	0.324	0.007**	0.015***	0.004**
	(0.028)	(0.043)	(0.211)	(0.003)	(0.006)	(0.002)
Year of entry FE	X	X	X	X	X	X
Class FE	X	X	X	X	X	X
Control Variables	X	X	X	X	X	X
Observations	27,100	12,261	1,895	27,100	12,261	1,895

Notes: The sample is a panel of undergraduate students' grades from 2000 to 2016. These students were admitted from 2000 to 2012 via FUVEST exam and concluded the course. Columns (1)-(3) present the estimates for average final grade as the dependent variable, columns (4)-(6) show the probit average marginal effects estimates for the approval rate. All regressions consider the complete specification with the year of entry fixed effects, classroom fixed effects, and inclusion of all control variables, respectively. The classification of the subjects is shown in Appendix Table A.2. Standard-errors are clustered at the class level. P-values:*p<0.1; **p<0.05; ***p<0.01.

Table 7 – Gender differences in final grade per discipline subcategory

	Final Grade								
	Econometrics	Finance	History	Intro.	Macro	Math	Micro	Social Sc.	Thesis
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Women	0.167***	−0.443***	0.204***	0.124**	−0.014	0.101*	0.034	0.207***	0.218
	(0.039)	(0.139)	(0.049)	(0.051)	(0.047)	(0.059)	(0.046)	(0.065)	(0.190)
Observations	9,475	744	8,831	4,353	6,471	4,144	6,400	2,072	2,449
R^2	0.143	0.223	0.168	0.247	0.315	0.301	0.212	0.313	0.435

Notes: The sample is a panel of undergraduate students' grades from 2000 to 2016. These students were admitted from 2000 to 2012 via FUVEST exam and concluded the course. All columns present the estimates for average final grade as the dependent variable and consider the complete specification with the year of entry fixed effects, classroom fixed effects, and inclusion of all control variables. Standard-errors are clustered at the class level. P-values:*p<0.1; **p<0.05; ***p<0.01.

Table 8 – Gender differences in approval rate per discipline subcategory

	Approval Rate								
	Econometrics	Finance	History	Intro.	Macro	Math	Micro	Social Sc.	Thesis
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Women	0.028***	−0.009	0.017**	0.00003	−0.002	0.0001	0.007	0.0001	0.001
	(0.006)	(0.010)	(0.007)	(0.00002)	(0.004)	(0.001)	(0.006)	(0.0001)	(0.001)
Observations	9,475	744	8,831	4,353	6,471	4,144	6,400	2,072	2,449

Notes: Results are probit average marginal effects. The sample is a panel of undergraduate students' grades from 2000 to 2016. These students were admitted from 2000 to 2012 via FUVEST exam and concluded the course. All columns consider the complete specification with the year of entry fixed effects, classroom fixed effects, and inclusion of all control variables. Standard-errors are clustered at the class level. P-values:*p<0.1; **p<0.05; ***p<0.01.

dominated by macroeconomics. These beliefs (as macroeconomics is a male-dominated field) affect female choices if women have lower grades, on average, in macroeconomics than other disciplines.

4 ANPEC exam performance

4.1 Data

To analyze gender differences in performance in a high-stakes exam, we use microdata directly provided by ANPEC for the 2004-2019 exams or the ANPEC exams.[24] The data contains information on the candidates' names[25], gender, age, in which year and institution they finished their undergraduate studies, how many times they took the exam, their performance on each test (microeconomics, macroeconomics, mathematics, statistics, Brazilian economy), their university choice, and their place in the official ANPEC Ranking.[26]

Figure 1 shows the number of students that took ANPEC exam by year. Since 2015, we can observe a positive trend in the number of students, and we see that, on average, 1,000 students per year take the exam. We can see how competitive the exam is when considering that the top 4 programs traditionally only accept students among the top 80 candidates.

Table 9 shows that women were a minority in terms of test-takers (33.1%), but most importantly, that their presence shrinks as we progress into the top positions. Only approximately 15% and 17% of the 50 and 100 students with the best performance are women. From now on, we will call these students top 50 high-achievers. This skewed distribution of female candidates implies that women are underrepresented among the most prestigious Economics graduate programs since admission was based during this period only on the exam.

Table 9 – Percentage of female candidates at ANPEC, 2004 to 2019

ANPEC Ranking	(%) Women
Top 50 in ANPEC Ranking	14.9
Top 100 in ANPEC Ranking	17.1
Top 200 in ANPEC Ranking	20.2
Total ANPEC Candidates	33.1

Notes: Total number of candidates in the ANPEC Exams 2004-2019 (including retakes) is 16,984.
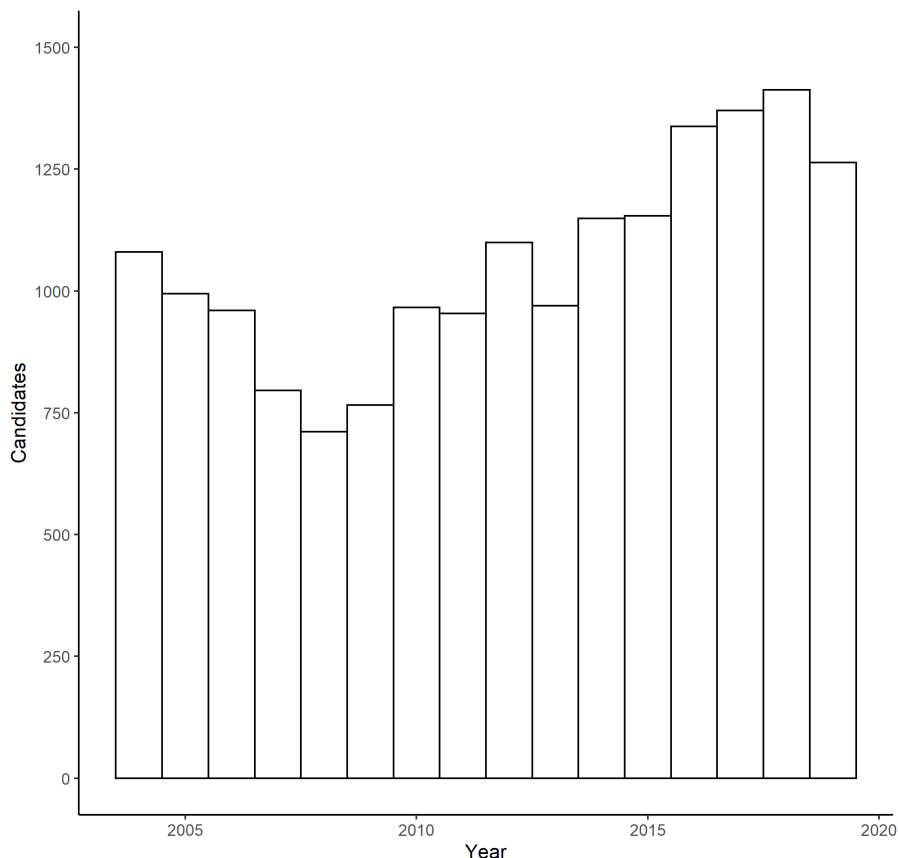
We have constructed the list of Economics students' names from USP who took ANPEC

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[24]Exams take place in the second semester of the year previous to admission. For example, the 2019 ANPEC exam was conducted in September 26th and 27th, 2018. http://www.anpec.org.br/novosite/br/exame.

[25]Except for the year 2005.

[26]Table A.4 in the Appendix compares the number of Economics students from FEA in our sample graduating per year, ANPEC candidates from FEA Economics course, and percentage of ANPEC candidates matched in our FEA sample.

Figure 1 – Total ANPEC candidates by year, 2004-2019

Source: ANPEC microdata.

between 2004 and 2019[27] and sent it to the course coordinator. They did the match and sent us the undergraduate academic record data of all ANPEC candidates from the university

Table 10 reports information about the students that were admitted at USP via the FUVEST exam, finished their undergraduate course in Economics at USP, and took the ANPEC exam. Approximately the same percentage of male and female students took the exam after graduation (around 21%). However, only 13.98% of women were considered high achievers (or ranked among the top 50), while 35.19% of men were high achievers. It is noteworthy that students from USP perform well in the exam since more than 70% of them, no matter the gender, are ranked among the best 200 and therefore can go to the most selective programs (CAPES 6 or 7).[28]

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[27]For the year 2005, we do not have data on the name of the students, but we had the graduation year and the email of ANPEC candidates. We have done an online search (and search within our own administrative records) to list the students' names based on this information. We were able to identify all the ANPEC candidates from online searches.

[28]CAPES is the system used in Brazil to benchmark the quality of research produced by graduate programs. It works on a scale of 3 to 7, with 7 (seven) being the highest score possible. Graduate programs rated as 6 or 7 reflect high-quality programs, international engagement, and faculty experience abroad.

Table 10 – Gender differences at ANPEC candidates by ranking, USP's students admitted from 2000 to 2012

Variables	Men	Women	Differences
Percentage in Top 50 Ranking at ANPEC	35.19	13.98	-21.21 ***
Percentage in Top 100 Ranking at ANPEC	50.37	34.41	-15.96 ***
Percentage in Top 200 Ranking at ANPEC	73.70	72.04	-1.66
Percentage of Students that took ANPEC	20.68	21.33	0.65

Notes: Sample in the percentage of students that took ANPEC exam is comprised of students admitted from 2000 to 2012 via FUVEST exam and concluded the course. We calculate the percentages in top positions conditional on the students that took the exam. P-values:*p<0.1; **p<0.05; ***p<0.01.

4.2 Empirical analysis

We now investigate the potential gender difference in performance of a high-stakes exams using the sample of USP students in Economics. As the USP students who took the ANPEC exam might present selection bias, we follow Heckman (1976) and estimate a selection equation to our model of interest using the whole sample of USP students in Economics.

$$ANPEC_i = \psi_0 + \psi_1 women_i + \eta' X_i + \gamma'_{t*} + \varepsilon_i \qquad (2)$$

where $ANPEC_i$ is the variable that indicates the USP students that took the ANPEC exam, and $women_i$ denotes if student is female and X_i the characteristics of student i (age, time to graduate, average grade). γ'_{t*} is the fixed effect of year of entry at USP's undergraduate program. We run a probit model for the selection equation.

The final objective is to investigate gender differences in performance in the ANPEC exam. The structural equation we estimate is the following:

$$y_{it} = \alpha_0 + \alpha_1 women_i + \gamma''_t + \phi' X_i + \lambda(\sigma ANPEC_i) + u_{it} \qquad (3)$$

where y_{it} is the sum of grades in ANPEC core exam (Mathematics, Microeconomics, Macroeconomics, and Statistics) for student i that took the exam in year t. $women_i$ is a dummy variable equal to 1 if the student is a woman and 0 if the student is a man. γ''_t is the fixed effect of the year-edition of the ANPEC exam. X_i is a matrix of control variables for student i. Finally, $\lambda(ANPEC_i)$ denotes the Inverse Mills Ratio of the selection equation. We also estimate alternative specifications of the outcome variable, such as the individual grade of each four disciplines of the ANPEC exam (to check for the possible heterogeneity of the results), and an indicator variable of the ANPEC candidate was ranked in the top 50.

In Table 11, we present the estimation results of the selection equation. Although women show smaller point-estimate probabilities of taking the exam than men, the difference is not statistically significant. The number of years after graduation decrease the probability of taking

the exam. Also, the higher the average grades in core undergraduate courses, the higher the probability of taking the exam.

Table 11 – Probability to take the ANPEC exam, FEA-USP students

	Take ANPEC Exam
Women	−0.032
	(0.024)
Age when started college	−0.012*
	(0.007)
More than five years to graduate	−0.077**
	(0.035)
Avg. grade in FEA core subjects	0.115***
	(0.013)
Year of entry FE	X
Observations	1,471

Notes: Results are probit average marginal effects. The sample is a panel of undergraduate students from 2000 to 2016. These students were admitted from 2000 to 2012 via FUVEST and concluded the course. Regression includes admission year at FEA-USP as fixed effect. Core disciplines in the undergraduate course are mandatory Mathematics, Microeconomics, Macroeconomics, and Econometrics subjects. P-values:*$p<0.1$; **$p<0.05$; ***$p<0.01$.

Table 12 shows the main results of the structural model correcting for the sample selection of students who take the ANPEC exam. The first column presents the results for the total sum of grades in ANPEC core exams, and the remaining columns present the results for each separate core discipline.

Results in the first column of Table 12 indicate that women perform worse than men at ANPEC and, on average, obtain grades that are 4.42 points lower than those obtained by men. To give an idea of the magnitude, each subject of the exam is worth 15 points, and so the exam sum 60 points, since we are looking at 4 subjects: Microeconomics, Macroeconomics, Statistics and Mathematics. Results through columns (2) to (5) of Table 12 show that women, on average, perform worse than men in all disciplines. This contrasts with our results for undergraduate grades, where women outperformed men in Econometrics (covered in the Statistics exam) and Math, and did not perform significantly different in Macroeconomics or Microeconomics.

Also from Table 12, we see that independently of discipline, the older the student is when he/she starts college and the more time he/she spends to graduate, the worse is the performance in the exam. Students' past performance in Economics helps to explain how well they do in

the exam. Last, the higher the average grade on core courses, the higher the grades in the exam, which does not come as a surprise since the exam covers the content taught in the core undergraduate courses.

Table 12 – Gender differences in grades at the ANPEC Exam, 2004 to 2019

| | Total | Grades by discipline | | | |
| | | Micro | Macro | Math | Statistics |
	(1)	(2)	(3)	(4)	(5)
Women	−4.417***	−1.291***	−1.297***	−1.002***	−0.826***
	(1.078)	(0.308)	(0.299)	(0.320)	(0.317)
Age when started college	−1.012***	−0.195**	−0.343***	−0.237**	−0.237**
	(0.319)	(0.091)	(0.089)	(0.095)	(0.094)
More than five years to graduate	−6.310***	−2.251***	−1.462**	−1.456**	−1.142*
	(2.238)	(0.639)	(0.621)	(0.670)	(0.660)
Avg. grade in FEA core subjects	5.243***	1.284***	1.243***	1.466***	1.251***
	(1.004)	(0.287)	(0.279)	(0.299)	(0.295)
Year of exam FE	X	X	X	X	X
Uncensored Observations	363	363	363	363	363
Censored Observations	1108	1108	1108	1108	1108
R^2	0.360	0.358	0.358	0.298	0.392
ρ	0.428	0.431	0.438	0.276	0.358
Inverse Mills Ratio	3.715 (3.329)	1.068 (0.950)	1.058 (0.924)	0.692 (0.993)	0.898 (0.980)

Notes: The sample is a panel of undergraduate students of FEA-USP admitted via FUVEST that took ANPEC exam from 2014 to 2019. All regressions include ANPEC year edition as fixed effect. P-values:*$p<0.1$; **$p<0.05$; ***$p<0.01$.

Finally, Table 13 shows the results of the structural model where the dependent variable in the model of interest is the probability of ranking among the top 50 best students. The results indicate that women are 29 percentage points less likely to rank in the top 50.

Table 13 – Gender differences in the likelihood of achieving the ANPEC Top 50, 2004 to 2019

Variables	I(achieving Top 50 in ANPEC rankings)
Women	−0.297***
	(0.053)
Control Variables	X
Year of exam FE	X
Uncensored Observations	363
Censored Observations	1108
R^2	0.224
ρ	0.220
Inverse Mills Ratio	0.090 (0.164)

Notes: The sample is a panel of undergraduate students of FEA-USP admitted via FUVEST that took ANPEC exam from 2014 to 2019. The dependent variable is a dummy that indicates the student achieved the Top50 rank in the ANPEC exam. Regression includes ANPEC year edition as fixed effect. Control variables: Age when started college; More than 5 years to graduate; Avg. grade in FEA core subjects. P-values:*p<0.1; **p<0.05; ***p<0.01.

5   Conclusions

In this paper, we investigate if male and female students in Economics react differently to evaluation stakes. We compare university students' performance in undergraduate Economics at the University of São Paulo (low-stakes exam). We also compared those who decided to attend a Master's program and took the ANPEC exam (high-stakes exam). The only admission criteria to a Master's program is the score in the ANPEC exam, so the average grade on the undergraduate program or any extracurricular activities/academic curriculum will have no direct impact on graduate school admission.

Our results indicate that women generally outperform men (measured by averaged grades) in the undergraduate disciplines or what we call low stake exams. We find that women have higher grades in disciplines classified as Quantitative and Humanities, and are approved at a higher rate than their male counterparts. However, when we look at a more disaggregated level, we find that, while women have better grades in Econometrics, History, Introductory courses, Math, and Social Sciences, men achieve higher grades than women in Finance.

Regarding the ANPEC exam, we find that, even though women have higher grades in undergraduate courses, they perform worse in the higher-stake exam. We do not find statistically significant differences between men and women selecting into the exam. However, we find evidence that women perform worse in all the exams (Microeconomics, Macroeconomics, Mathematics, and Statistics) and have a lower probability of ranking among the top 50 students.

We can conclude that there are gender differences in reaction to increased stakes, but we still

have to evaluate the potential channels through which these differences emerge. One possibility is that male and female students react differently to performance shocks. As the ANPEC exam is held over two consecutive full days, students that faced a negative performance shock in one day (or in the morning) would be more likely to be under more pressure in the next day (or in the afternoon) exam.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Bibliography

Azmat, G., Calsamiglia, C. and Ibierri, N. (2016), 'Gender differences in response to big stakes', *Journal of the European Economic Association* 14(6), 1372–1400.

Beneito, P., Boscá, J. E., Ferri, J. and García, M. (2018), Women across Subfields in Economics: Relative Performance and Beliefs.

Borges, B. and Estevan, F. (2021), Does Exposure to More Women in Male-Dominated Fields Render Female Students More Career-Oriented?
URL: *https://papers.ssrn.com/abstract=3789018*

Borges, B., Estevan, F. and Morin, L.-P. (2021), When diligence backfires: Gender differences in prioritizing rewarding tasks.

Cai, X., Lu, Y., Pan, J. and Zhoug, S. (2019), 'Gender gap under pressure: Evidence from china's national college entrance examination', *Review of Economics and Statistics* 101(2), 249–263.

Dohmen, T. and Falk, A. (2011), 'Performance pay and multidimensional sorting: productivity, preferences, and gender', *American Economic Review* 101(2), 556–590.

Estevan, F. and Santos, K. (2022), 'Does it matter which top institution you choose? a case study of brazilian graduate admissions', *Working Paper* .

Gneezy, U. and Nierdele, M. (2003), 'Performance in competitive environments:gender differences', *Quarterly Journal of Economics* 118(3), 1049–1074.

Heckman, J. (1976), 'The common structure of statistical models of truncation: sample selection, and limited dependent variables and a simple estimator for such models', *Annals of Economic and Social Measurement* 5, 475–492.

Hvidman, U. and Sievertsen, H. H. (2021), 'High-stakes grades and student behavior', *Journal of Human Resources* 56(3), 821–849.

Jurajda, S. and Münich, D. (2011), 'Gender gap in performance under competitive pressure: admission to czech universities', *American Economic Review* 101(3), 514–518.

Nierdele, M. and Vesterlund, L. (2007), 'Do women shy away from competition? do men compete too much?', *The Quarterly Journal of Economics* 122(3), 1067–1101.

Nierdele, M. and Vesterlund, L. (2011), 'Gender and competition', *Annual Review of Economics* 3(1), 601–630.

Ors, E., Palomino, F. and Peyrache, E. (2013), 'Performance gender gap: Does competition matter', *Journal of Labor Economics* 31(3), 443–499.

Pekkarinen, T. (2015), 'Gender differences in behaviour under competitive pressure:evidence on omission patterns in university entrance examinations', *Journal of Economic Behavior Organization* 115, 94–110.

Petterini, F. C. (2020), 'Brazilian academic economics: A picture from the ANPEC exam microdata', *EconomiA* 21(3), 325–339.

Rask, K. and Tiefenthaler, J. (2008), 'The role of grade sensitivity in explaining the gender imbalance in undergraduate economics', *Economics of Education Review* 27(6), 676–687.

Rocha, F., Pereda, P., Matsunaga, L., Diaz, M. D. M., Narita, R. and Borges, B. P. (2021), 'Gender differences in the academic career of economics in brazil', *Cuadernos de Economía* 40(84), 815–854.

Santos, K. G. (2020), Does it matter which top institution you choose? a case study of brazilian graduate admissions. Master's Thesis.

Saygin, P. O. and Atwater, A. (2021), 'Gender differences in leaving questions blank on high-stakes standardized tests', *Economics of Education Review* 84, 102162.

Scoppa, V. and Paola, M. D. (2010), 'Peer group effects in the academic performance of Italian students', *Applied Economics* 42, 2203–2215.

A Appendix

Table A.1 – Gender differences in Top FUVEST Ranking positions, Economics students at FEA-USP admitted from 2000 to 2012

Variable	Men	Women	Difference
Percentage in the top 25 FUVEST Ranking	12.71	11.34	-1.37
Percentage in the top 50 FUVEST Ranking	25.95	24.43	-1.51
Percentage in the top 100 FUVEST Ranking	44.38	40.49	-3.89 *

Notes: In this table we observe the frequency in which women and men admitted were placed in each of these top FUVEST Ranking positions. Student's FUVEST Ranking is conditional on being admitted at FEA-USP. P-values: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A.2 – Classification of mandatory disciplines in Economics at FEA-USP

Category	Subcategory	discipline name	frequency	%
Quantitative	Econometrics	Econometrics I	2,722	4.54
Quantitative	Econometrics	Econometrics II	2,409	4.02
Quantitative	Econometrics	Econometrics III	2,197	3.66
Quantitative	Econometrics	Introduction to Probability and Statistics I	2,364	3.95
Quantitative	Econometrics	Introduction to Probability and Statistics II	2,388	3.98
Quantitative	Finance	Math for Finance Analysis	1,015	1.69
Quantitative	Introduction	Introduction to Economics I	2,335	3.90
Quantitative	Introduction	Introduction to Economics II	893	1.49
Quantitative	Macro	Social Accounting and Balance of Payments	1,212	2.03
Quantitative	Macro	Macroeconomics I	2,580	4.31
Quantitative	Macro	Macroeconomics II	2,652	4.43
Quantitative	Macro	Accounting and Balance Analysis	2,382	3.98
Quantitative	Math	Calculus I	1,151	1.92
Quantitative	Math	Calculus II	1,030	1.72
Quantitative	Math	Calculus I for Economics	1,413	2.36
Quantitative	Math	Calculus II for Economics	1,321	2.20
Quantitative	Math	Math Applied to Economics	955	1.60
Quantitative	Micro	Microeconomics I	2,623	4.38
Quantitative	Micro	Microeconomics II	2,383	3.97
Quantitative	Micro	Economics of the Public Sector	933	1.56
Quantitative	Micro	International Economics I	2,260	3.77
Humanity	History	Introduction to Classics of Economic Thought	2,768	4.62
Humanity	History	General Economics History I	2,822	4.71
Humanity	History	Social and Economic Formation of Brazil I	2,979	4.97
Humanity	History	Social and Economic Formation of Brazil II	1,367	2.28
Humanity	History	Brazilian Economy I	2,027	3.39
Humanity	Introduction	Introduction to Analysis of Economic Context I	1,910	3.19
Humanity	Introduction	Introduction to Analysis of Economics Context II	1,133	1.89
Humanity	Social Sciences	Law Institutions for Economists	2,126	3.55
Humanity	Social Sciences	Introduction to Social Sciences	757	1.26
Other	Thesis	Techniques of Research in Economics	622	1.04
Other	Thesis	Final Thesis	2,189	3.65

Table A.3 – Classification of all disciplines, Economics at FEA/USP

Discipline Name (In Brazilian Portuguese as original)	Subcategory	Category
Cálculo Diferencial e Integral I-II; Cálculo Diferencial e Integral para Economia I-II	Cálculo (Calculus)	Exatas (Quantitative)
Introdução à Análise da Conjuntura Econômica I-II	Conjuntura (Context)	Humanas (Humanities)
Contabilidade e Análise de Balanço	Contabilidade (Accounting)	Exatas (Quantitative)
Instituições de Direito para Economistas	Direito (Law)	Humanas (Humanities)
Econometria I-IV; Economia Regional e Urbana; Estatística Econômica e Introdução à Econometria	Econometria (Econometrics)	Exatas (Quantitative)
Introdução à Estatística Econômica; Introdução a Probabilidade e a Estatística I-II	Estatística (Statistics)	Exatas (Quantitative)
Análise e Elaboração de Projetos; Economia do Mercado de Capitais Renda Fixa /Derivativos/Matemática Financeira	Finanças (Finance)	Exatas (Quantitative)
Economia Brasileira Contemporânea I-II; Economia Brasileira; Economia e Demografia da Escravidão; Formação Econômica e Social do Brasil I-II; Sindicalismo e Negociação Coletiva; Agricultura e Desenvolvimento no Brasil; Economia Agrícola	História - Brasileira (Brazilian History)	Humanas (Humanities)
Clássicos do Pensamento Econômico; Introdução aos Clássicos do Pensamento Econômico	História - Clássicos (Classic Economic History)	Humanas (Humanities)
História do Pensamento Econômico I; História Econômica e Geral: Tópicos Especiais; História Econômica e Geral I- II; História Mundial Contemporânea	História - HEG (General Economic History)	Humanas (Humanities)
Introdução à Economia I-II	Introdução (Introduction)	Outro (Other)
Estágio Supervisionado I-VI; Economia Brasileira para Administradores; Economia dos Recursos Humanos nas Organizações; Introdução à Economia I para Não Economistas; Introdução à Economia II para não Economistas; Introdução ao Desenvolvimento Sustentável	Livre (Free Electives)	Outro (Other)

Leituras Orientadas em Macroeconomia; Macroeconomia Aplicada; Macroeconomia I-II; Macroeconomia III - Tópicos Especiais; Macroeconomia Pós-Keynesiana; Teoria Macroeconômica I-III; Contabilidade Social; Contabilidade Social e Balanço de Pagamento; Economia Monetária - Moeda e Bancos; Teoria e História da Moeda	Macroeconomia (Macroeconomics)	Exatas (Quantitative)
Economia Matemática I-II; Matemática Aplicada à Economia	Matemática (Math)	Exatas (Quantitative)
Microeconomia I-II; Teoria dos Jogos; Teoria Microeconômica III; Economia do Meio Ambiente e dos Recursos Naturais; Distribuição de Renda, Desigualdade e Pobreza; Economia da Informação e Governança Corporativa; Economia Industrial - Organização Industrial; Organização Industrial e Antitruste; Economia da Saúde; Economia do Setor Público - Finanças Públicas; Economia do Setor Público; A Economia e o Sistema Jurídico do Estado; Economia do Trabalho; Economia e Comércio Internacional; Economia Internacional - II; Economia Internacional I: Teoria e Política do Comércio Internacional; Fundamentos de Economia para o Comércio Internacional	Microeconomia (Microeconomics)	Exatas
Monografia; Técnicas de Pesquisa em Economia	Monografia (Thesis)	Outro (Other)
Economia Política Contemporânea; Questões Sociais Contemporâneas; Demografia Econômica; Desenvolvimento Econômico e Social; Economia Aplicada II; Tópicos em Análise e Teoria Econômica; Economia e Complexidade; Economia Institucional; Análise de Insumo Produto; Leituras Orientadas I, II; Leituras Orientadas IV em Antitruste; Metodologia da Economia I-II; Economia e Responsabilidade Social; Tecnologia e Desenvolvimento	Outro (Other)	Outro (Other)

Introdução às Ciências Sociais; Sociologia Econômica I-II; Teoria do Valor	Sociologia (Social sciences)	Humanas (Humanities)

Table A.4 – Percentage of ANPEC Candidates from FEA-Economics matched in our sample, 2004-2019

Year	FEA Econ students graduating	ANPEC candidates from FEA Econ	Pct. of candidates matched
2004	62	80	10.00
2005	118	53	45.28
2006	135	56	64.29
2007	139	33	78.79
2008	145	6	83.33
2009	135	47	85.11
2010	138	42	90.48
2011	142	41	92.68
2012	158	34	100.00
2013	126	33	93.94
2014	154	33	90.91
2015	154	30	96.67
2016	148	55	85.45
2017	0	61	70.49
2018	0	62	50.00
2019	0	55	20.00

Notes: Our sample of Economics students at FEA-USP is comprised of students admitted between 2000 and 2012 via FUVEST that concluded the course. Students can take the ANPEC exam more than once.