The Effect of the Availabilty of Student Credit on Tuitions: Testing the Bennet Hypothesis using Evidence from a Large-Scale Student Loan Program in Brazil

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Abstract

We test whether the availability of student loans increases tuition costs, the *Bennet Hypothesis*. Starting in 2010, there was a major ramp-up in the FIES, a student loan program funded by the Brazilian federal government. FIES's rules for eligibility produce a marked heterogeneity in the access to funding in different higher education institutions. We take advantage of these rules and of an unique dataset with information on tuition costs at the major-college level, and document two facts. Using a difference-in-differences approach, we show that relaxing access to student loans caused an increase in tuition fees. We also estimate a structural model of demand, and show that relaxing credit constraints reduces the demand price elasticity. Thus the mechanism behind the increase in tuition costs is an increased tuition insensitivity, at least in part.

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1 Introduction

Because human capital cannot be pledged as collateral, credit markets for human capital investment as particularly problematic (Becker, 1967). Thus, frictions in credit markets justify government-sponsored student loans and student aid programs. However, relatively little is known about the consequences of interventions in student lending markets, particularly its consequences for tuition costs. Similarly to other markets - such as housing - credit-fueled increases in the price of the 'asset' can have detrimental consequences, such as over-investment and bubbles. We contribute by documenting the impact on tuition costs and on the demand for higher education of a large and rapid increase in the availability of student loans. Specifically, we use an unique dataset to investigate the consequences of the ramp-up of a large Brazilian Federal Government student loan program.

Policy makers have raised the conjecture that student aid may translate into higher tuitions costs, the so-called *Bennet Hypothesis*. In a famous Op-Ed piece on the New York Times published in 1987, William Bennett - then the U.S. Secretary of Education - asserted that the availability of government sponsored student aid have enabled higher education institutions to raise tuitions, since students could offset price increases with federal loans. Since then, some papers have attempted to test this hypothesis, with mixed results (see Hoxby, 1997). In this paper, we test the *Bennett Hypothesis* and find strong supportive evidence for Brazilian case. In addition, we document one possible mechanism: a credit-fueled reduction in demand tuition-elasticity.

We study the impact of the ramp-up of the *Fundo de Financiamento Estudantil* (FIES). The FIES is a major Brazilian Federal Government student lending program. It offers loans to students in private higher education institutions. Created in 1999, the program gained practical relevance after substantial operational and normative changes that occurred throughout 2010. Since then, the demand for student loans increased consistently. Between 2009 and 2012, the number of loans increased eleven times. In 2012, new loans covered approximately 20% of the number of students newly enrolled in private higher-education institutions in Brazil.

Using a unique dataset with information on tuition fees at the college and major level, we document two facts. First, the availability of FIES has a strong impact on tuitions. Eligibility rules at the college-major level produces heterogeneity in the access to FIES, allowing us to construct a control group of institutions not affected by FIES. Second, we estimate a structural demand model, and show that FIES availability reduces the demand tuition-elasticity. Thus, the mechanism behind the credit-fueled increase in tuitions is a reduction in price sensitivity, at least in part.

From a policy perspective, it is important to understand the precise mechanism behind the FIES-driven increase in tuitions. If the availability of student lending does not change the demand tuition-elasticity, then any FIES-driven increase in tuitions probably reflect increased marginal costs of supplying tertiary education. In this case, Individuals would be internalizing the increased cost of tertiary education. Implications are different if FIES reduces the demand tuition-elasticity of demand. One consequence is an increase in rents for the tertiary education industry. More consequentially, demand tuition-inelasticity suggests that individuals are not internalizing the full costs of tertiary education, making them prone to over-invest in higher education. This is especially true because the FIES' loans are heavily subsidized. Low price sensitivity may reflect an expectation of renegotiation, or overconfidence in the higher education returns. Over investment is a serious problem if individuals undertake negative Net Present Value tertiary education. In Brazil, this is still unlikely to be case because of the high premiums to tertiary education, but premiums have dropped substantially over the last 15 years (Ferreira et al., 2014).

The paper is organized as follows. Section II contains a brief literature review. Section III provides some institutional brackgroud on FIES, and describe the operational and normative changes that occurred throughout 2010. In section IV, we describe the unique dataset we use, which contains information on tuition fees at the major and college level, as well as a rich set of college and major characteristics. Observing fees at this level of disaggregation is crucial to our identification strategy. Section V present reduced-form estimation strategy and results. We explore a rule that created variation in FIES elegibility at the school-major level. We find a causal impact of the availability of student lending on tuition fees. Tuitions of major-school pairs that were eligible to FIES increased relative to similar non-eligible major-school pairs. In section VI, we itake strucutral-form approach to investigate one mechanism behind the reduced-form results. We estimate a differentiated-produtct demand system to measure whether the availability of FIES changes the demand tuition-elasticity. We explore whether changes in the demand tuition elasticity explain the magnitude of the FIES-induced increases in tuitions. Section VII concludes.

2 Related Literature

In general, our work relates to the literature on the impact of government-sponsored student lending for tertiary education. Most papers investigate the impact of credit availability on measures of quantities, such as enrollment and drop-out. More especifically, we relate directly to the few articles that investigate the effect of credit availability on prices, i.e., tuitions fees.

From a normative perspective, government-sponsored student lending can be justified if imperfections in credit markets prevent students from accessing loans when it would otherwise be constrained-optimal that they did. And it is reason to assume imperfect credit markets produce an outcome worse than the constrained optional. It is difficult to pledge future income as collateral. In addition, poor students rarely have pledgeable assets (Becker, 1967). The imperfection in intermediation plausably leads to under-investment in human capital, justifying governmental intervention in all levels of instruction, including tertiary education. A large literature investigates the empirical relevance of borrowing constraints on schooling choices.[1]

Evidence is mixed as to the empirical relevance of credit market imperfections in tertiary education. Using the NLSY79 database, Cameron and Heckman (1998) investigate the influence of parental income on college enrollment. They find a that higher family incomes are persistently related to school attainment, but the relationship is not robust to the inclusion of the Air Force Qualifying Test (AFQT) as a measure of ability. Thus, higher family income is associated with higher student attainment not because it substitutes for credit, but because it captures students' non-observed cognitive and non-cognitive characteristics that help them achieve higher levels of education. Carneiro and Heckman (2002) also use the NLSY79, and find that only 8 % of US population is credit constrained. The family income - school attainment relationship is mostly determined by long-run factors, such as genetic inheritance or investments in education in early childhood, which take the form of 'ability'. Long-run factors are not easily mitigated with short-run interventions such as higher education aid programs. Keane and Wolpin (2001) estimate a structural model of schooling choice, allowing the decision to work and to consume to be endogenous.

[1] It is beyond our scope to review the literature in full. We provide a quick overview with the minimum necessary to position our paper in the literature. Lochner and Monge-Naranjo (2011) provide an extensive review.

Using the NLSY79 they find that parental transfer and unobserved heterogeneity account for most of the variation in tertiary education enrollment. Thus, borrowing constraints are not very relevant in practice. Cameron and Taber (2004) also find a limited role for borrowing constraints in college enrollment.

Recent papers using newer data find opposing results. Kane (2007) documents that family income has become increasingly relevant over time as a determinant of college attendance. Belley and Lochner (2007) use techniques similar to Carneiro and Heckman (2002) to investigate the family income - attainment relationship using data from both the NLSY79 and the NLSY97. Using the NLSY79, they replicate Carneiro and Heckman's (2002) findings. When using the NLSY97, they find a substantial increase of the influence of family income on college attendance. They also find that students from richer family go to higher quality colleges.

More directly related to our work, several papers have looked at the impact of governmental student aid on several outcomes, most notably enrollment and drop-out rates. Dynarski (2003) investigate if financial aid has a positive effect on college attendance and completion. Because aid eligibility is often correlated with unobserved factors that influences schooling decision, it is challenging to measure the causal impact of the financial aid on college attendance. Dynarski (2003) analyzes the effects of the discontinuation of the Social Security Student Benefit Program in 1982. Under this U.S. federal government program, children from deceased, disabled or retired Social Security beneficiaries received monthly payments while enrolled in full-time college. The author uses a difference–in–differences methodology in which the death of a parent during a person's childhood is defined as a proxy for benefit eligibility. As a results of the discontinuation of the program, the probability of attending college dropped by more than a third. More specifically, offering $1,000.00 in grant aid increases the probability of attending college by 3.6%.

Kane (2003) evaluates the enrollment impacts of CalGrant, a financial aid program sponsored by the state of California. Students are eligible for the program only if they meet a few eligibility criteria. They must achieve a minimum high school GPA, and have income and financial assets below a certain threshold. The author explores these discontinuities to analyze the impact of financial aid on college enrollment. Results suggest a substantial impact of program eligibility on college enrollment. The probability of college enrollment is 4 % higher for eligible versus comparable non-eligible students.

Dynarsky (2000) explores Georgia's HOPE Scholarship to estimate the impact of aid policies aimed at students from middle and high income families. The program allows free attendance at Georgia's public colleges for state residents with a minimum high school performance. The author uses individuals from nearby states as a control group to implement a difference-in-differences procedure. The results show that college attendance increases by at least 7.0 percentage points as a result of the program.

Finally, Rau et al. (2013) estimate a structural model of sequential decisions in order to evaluate the impact of short-term borrowing constraints on dropouts. The authors analyze the impact on drop-out rates of the Crédito con Aval do Estado (CAE), a Chilean-government student loan program. They find that both higher family income and access to credit reduce the probability of dropping out. They also find that, although CAE reduces the dropout rates, graduates with CAE financing have a worse performance in labor markets, possibly because schools lower standards to allow them to graduate.

There are two main conclusions from literature on quantities: 1) credit constraints matter, especially for more recent cohorts; 2) government-sponsored increases enrollment and reduces drop-out rates. But what about prices? Lochner and Monge-Naranjo (2011) posit that the stronger relationship between family income and school attainment for more recent cohorts is a result of two factors: a substantial increase in both costs and returns associated with higher education, combined with limits on government student loans plateauing in real terms. They touch an important aspect, yet somewhat overlooked: increased tuition costs. From 1984-85 to 2014-15, average posted tuition and fees increased substantially in the US. The observed raise for private four-year institutions was of 146%, with the average posted tuitions increasing from $12,716 (in 2014 dollars) to $31,231. The average posted tuitions at public two-year colleges rose by 150%, from $1,337 to $3,347. The increase in tuitions for in-state students at public four-year institutions was of 225%, with the average tuition increasing from $2,810 to $9,139 [2]. Clearly, increasing returns to education combined with increasing marginal costs may explain the increased tuition costs. But credit availability is another culprit, the so-called "Bennet Hypothesis". Our work relate directly to the few studies that investigate the impact of student loans' programs on tuition fees, a relatively less-known consequence of student lending.

Hoxby (1997) is an early mention of the "Bennett Hypothesis" as a possible explanation for tuitions rises in the U.S..[3] However, she finds no support the hypotheiss. Instead, she credits the changing market structure of the US tertiary education industry for most of the variation in tuition costs over time (until 1991). Dinarsky (2000) analyzes the impact of Georgia's HOPE Scholarship, a merit-aid program, on tuitions by comparing the trends in schooling costs in Georgia and in the U.S. in general. The results suggest that the program had inflationary effects on college costs in Georgia.

Closely related to our work, Long (2004) also uses the introduction of Georgia's HOPE Scholarship as a quasi-natural experiment to examine its impacts on college pricing, institution aid, and expenditures. Using a difference-in-differences strategy, the author finds strong evidence that four-year colleges in Georgia, particularly the private ones, increased tutions and reduced institutional aid in response to the HOPE program.

Our work contribute to this small literature on tuition costs. Similarly to Long (2004), and to a lesser extent to Dinarsky (2000), we explore a quasi-natural experiment. But we analyze the large-scale ramp-up of a national program using a different identification strategy. Using a reduced-form strategy, we explore the heterogeneity in the program elegibility in order to measure the causal link from the introduction of FIES to tuition fees. In addition, we go one step further and estimate a structural demand model to document one possible mechanism behind the reduced-form causal link from credit availability to tution fees.

From a positive perspective, a government student loan program can only have an impact on tuition if borrowing constraints are relevant to begin with. Differently from the U.S. case, there is no documentation on the existence of borrowing constraints for tertiary education in Brazil. Nevertheless, three facts strongly suggest the students in Brazil face strong borrowing constraints. First, Brazilian credit markets perform very poorly relative to the US (De Mello and Garcia, 2012). Second, returns on tertiary education, albeit slowly dropping, are still very high in Brazil; discount rates would have to be over 500% a year to justify the returns (Ferreira et al, 2011). Last but not least, the sharp increase in enrollment following the ramp-up of FIES suggests a repressed demand for higher education.

[2] College Board

[3] Schapiro et al. (1989) is one of the first studies whose goal is to document the effects of federal subsidy policies changes on higher education institutions behavior.

3 FIES

The Fundo de Financiamento Estudantil (FIES) is a Brazilian Federal Government student loan program. It offers loans to cover tuition fees to low and middle-income students in private higher education institutions.[4] Eligibility criteria involves students and the major-college pair.[5]

FIES's Loans cover from 50% to 100% of tuition expenses. The fraction of the tuition eligible for financing depends on the student's family income and on the proportion of the income committed to tuition expenses. The rules are as follows. FIES finances: 1) full tuition for students whose gross household income is under 10 minimum wages, and income commitment to tuition is more than 60 % of the per capita household income; 2) 75% of tuition for students whose gross family income is under 15 minimum wages, and income commitment to tuition is between 40% and 60 % of the per capita household income; 3) 50% of tuition for students whose gross household income is under 20 minimum wages, and income commitment to tuition is between 20% and 40 % of the per capita household income;

As long as the student is enrolled, the higher education institution receives the value of the tuition in Treasury Bond, not cash (the bonds are called textitCertificado Financeiro do Tesouro Série E -CFT-E). These bonds can be traded as payment for Social Security obligations. In addition, the government holds repurchase auctions of these bonds in secondary markets.

FIES was created in 1999, but became a relevant source of higher education financing after operational and normative changes implemented throughout 2010. The government fixes a subsidized interest rate for all loans under FIES. By the end of 2009, the rate was reduced from 6.5% to 3.5% per year. For a comparison,in the end of 2009, the interbank rate set by the central bank was 12% a year. In 2010, the rate was further reduced to 3.4 %. The rate applied to the new loans and to the stock of previous concessions. Before the changes, students had to apply and participate in selection processes at specific dates. After 2010, students could apply on a continuous basis.

Repayment conditions also changed. While enrolled students interest expenses are due every three months, up to a maximum of R$50.00 (roughly USD 14). Before 2009, principal payments and remaining interest were due in six months. The grace period was extended to 18 months. The maturity of the loan also increased, from twice the life of the loan period to three times the life of the loan period plus twelve months.

Finally, there was a considerable increase in the secondary market repurchases of the CFT-E bonds, increasing their liquidity. Before 2010, there was no rule as to the frequency of auctions. After 2010, the government established a minimum of four repurchases per year.

These changes produced a sharp increase in student loans. Figure 1 depicts the trend of new loan concessions under FIES through time. Between 2009 and 2012, the number of new FIES loans increased eleven times. In 2013, there was an additional 48% increase.

4 Data

We use information from three sources. Fist, the *Censo do Ensino Superior* (Higher Education Census), a nationwide annual survey that provides information about the universe

[4]Public universities are free of charge. Entrance exams are very competitive, and only the top performing students get admitted.

[5]In Brazil, students "declare" major upon admission.

of higher education institutions. The census contains detailed information on institutions' and students' characteristics, and is available from 1995 through 2012. We exclude public tuition-free universities from the analyses because the FIES loan is for tuition, and thus applies only to privately-held tuition-charging institutions.

The Census contains four sets of information. First, institution characteristics, such as number of employees by type (instructor, professor, administrative, etc), infrastructure, and financials.

Second, information at the major level, such the number of credits required to graduate, minimum length of the program, number of applicants, and number of enrolled students. Each major is grouped into three different academic subject areas according to Ministry of Education classification (humanities, quantitatitive, and biomedics).

Quite importantly for our analysis, the Census contains two different measures of quality, both from the standardized evaluations conducted by the Brazilian Ministry of Education. The first is the ENADE, the National Exam of Student Performance. The ENADE is an exam administered to freshman and seniors. Majors are grouped into three areas and each year one of the areas is subject to the assessment. Thus, each undergraduate major in Brazil is assessed every three years. The pair major-college receives a grade according to the average performance of the students in the major-college pair. The grade ranges from one to five, in increasing order of quality. The Ministry of Education considers grades equal to or greater than three to be sufficiently good.

The second quality measure is the CPC – Preliminary Score of Major. Similarly to the ENADE, majors are grouped into the three great areas, and each one of these areas is evaluated every three years. The evaluation considers several dimensions. First, the quality of the faculty, measured by three proxies: the proportion of instructors with a Ph.D., the proportion of instructors with a least a Master's degree at least, and the proportion of full-time professors. Second, the quality of infrastructure, including the presence of a library, the number of laboratories, etc. Lastly, a measure of aggregate value: the difference ion the performance of seniors at the ENADE exam, and the expected performance given the student's social-economic background. Each dimension receives a grade one through five, in increasing order of quality. The major-school's CPC is the average of the three dimensions.

Starting in 2009, the Census contains detailed information on students and instructors. Student data includes demographics, scholarships, and financial aid by source and type. Crucial to our purposes, we know the number of recipients of FIES's loans. Regarding instructors, we have data on demographics, education, and employment type (part-time versus full).

Tuition costs vary considerably across colleges and across majors within colleges. The Census does not provide information tuition and fees at the major level. We overcame this major short-coming by accessing a unique database from Hoper, a consultancy firm specialized in the educational sector. The data cover 90% of institutions in Brazil and contain information about tuition at the major-school. Tuition data at the major-school level data is rather unique, as few studies have access to such data.

The third source of information is the dataset *Relação Anual de Informações Sociais* (RAIS) from the Ministry of Labor. The RAIS dataset contains detailed information on all wage earners from the formal sector. From the RAIS we construct city-level annual series of salaries of instructors' and administrative workers. The wage data are important for the estimation of the strucutral parameters. [6]

[6] The Brazilian labor market has a large informal sector. However, universities operate under formality.

Finally, financial information from Brazilian public-traded education companies comes from Bloomberg.

5 Reduced Form

We make two contributions to the measurement of the causal effect of financial aid on tuition costs. The literature normally evaluated state-level programs, such as Georgia's Hope, which are limited in scope. We evaluate a national, large-scale student lending program.

Identification is particularly challenging when measuring the causal impact national-wide programs, which possibly explains the scarcity of convincing evaluations of federal student lending programs. We explore two features of FIES. First, FIES had a major ramp-up in the size of the program during the year 2010, which gives substantial time-series variation. In addition, eligibility varied across institutions at the baseline of the ramp-up, providing cross-section identifying variation.

Figures 1) and 2 depict the evolution of FIES loans overtime. Between 2009 and 2012, the number FIES loans increased eleven times; in 2013, it increased an additional 48% (see Figure 1). In 2012, the program covered 20% of the newly enrolled in private institutions. Figure 2 depicts the evolution of FIES disbursements, which increased by 400% between 2009 and 2012.

FIES's rules creates variation in eligibility. To qualify, students have to be enrolled in major-college pairs whose evaluation by the Ministry of Education reaches a minimum threshold of quality. Majors are defined as broad "knowledge" groups (22 groups according to fields of knowledge, using the same classification as the Ministry of Education). We classify as eligible the major-college pairs with score three or above on the CPC evaluation. In addition, major-schools that have not yet been subject to evaluation are eligible pending evaluation, and are also classified as eligible. [7]

The FIES ramp-up, along with the eligibility rules, provides a quasi-natural experiment. The sudden ramp-up in FIES affected the eligible major-college pairs, i.e., major-college pairs that had the ENADE score of three or higher in the 2010 baseline. The decision to ramp-up the FIES was made in the end of 2009, beginning of 2010; schools did not have sufficient time to react to it. After all, the evaluation is performed at every three years.

We implement a Difference-in-Differences strategy (DID). We measure the causal effect of FIES by comparing the change in tuition of eligible major-schools - the treatment group - with changes in non-eligible major-schools, the control group. We define the years of 2009 and 2010 as our pretreatment period and the years of 2011 and 2012 as our post treatment period. The normative and operational changes occurred throughout 2010; 2011 is the first year we observe a major increase in the number of student loans.

Table 1 contains descriptive statistics for both groups.

We estimate the following linear model:

$$log(Tuition)_{it} = \theta + \varphi D_t * Treatament_i + \rho X_{it} + \mu_t + \eta_i + \zeta_{it} \tag{1}$$

[7] Technically, eligilibility is based, with equal weight, on the ENADE score, on the CPC score and on the CC score - which is based on a in-site evaluation by MInistriy's auditors also counts for eligibility. Because, the census does not contain the CPC and CC for all institutions, we do not consider it in our analysis; thus our treatment effect is an intention to treat effect. In practice, being eligible according to the CPC correlates very strongly with being eligible.

The dependent variable is the natural logarithm of tuition fee for major-college i in period t. D_t is a period dummy variable that is equal to one in post-treatment periods (2011 and 2012 in most specifications). $Treatment_i$ is a dummy equal to one if the major-college i was eligible for receiving the FIES funding. The parameter φ is the causal effect of FIES on tuition costs. X_{it} is a vector of time-varying controls. We also include major-school -η_i - and time - μ_t - fixed effects. The ε_{it} represents the stochastic error term. Table 2 presents the estimates of the parameters in (1).

The first row in Table 2 shows the estimates of φ, the main parameter of interest. The estimates do not change as we introduce an increasing set of controls, including time and major-school dummies. FIES increases tuition by in 7.86%. Introducing a large set of controls does not change estimates meaningfully. Column (6) presents the the most complete specification. It contains major-college, year and city fixed-effects, besides controls for quality (applicant-to-spots ratio, ministry of education quality measure, percentage of faculty with doctoral degree), size (number of degrees, number of administrative faculty, total faculty), and market concentration (the HHI index). FIES increases tuitions by 6.1%.

Incidentally, coefficients on the control variables either have the expected sign or are zero (statistically and economically). Tutiions are higher in school-major pairs with higher quality, according to the three measures (applicants-to-spots ratio, the ministry of education measure and faculty with doctoral degree).

We argue below that treatment is exogenous. But even assuming exogeneity, the control group may be affect by the treatment, which will change the interpretation of the DID estimates. Consider a duopoly market in which only one college qualified for FIES. Differences in tuitions post-treatment may be due to an increase in tuition at the qualified college, and reduction at the unqualified, or both. Interpretation of the results, and welfare implications, are different if competition is pushing prices down at non-qualified colleges, instead of driving prices up at qualified (treatment) colleges. In particular, the Bennet Hypothesis concerns the later not the former. To shed some light, we reestimate the model focusing only on monopoly markets (we define a market as a city - major pair. We select cities with only one colleges). The DID estimate now computes the difference in the trend of tuitions in monopoly markets in which the monopolist qualified for FIES against monopoly market in which the monopolist did not quality. Because many colleges operate in several markets, qualifying tends to be exogenous to city-level variation. Nevertheless, it is particularly important to control for city-fixed effects in this case.[8] Table 3 shows the results. FIES has, if anything, a stronger impact in monopoly markets, considering the most complete specification (columns (6) in Table 3). The result is still precisely estimated a much smaller sample size.

5.1 Reduced Form: Validity of Assumptions and Robustness

In this section, we argue that the identification assumptions are plausible, and test the robustness of the results.

Equation (1) is a reduced-form object. Thus, the error ζ_{it} contains all the observed supply and demand shifters that affect prices. On the demand side, causal interpretation rests on the crucial assumption that unobserved time-varying heterogeneity in quality is systematically related to being higher quality in the 2010 baseline. Treatment is defined by differences in quality - as measured by the Ministry of Education - in the baseline (2010). Clearly, higher quality major-colleges, either as perceived by students or as measured by

[8] We do not have city-level time-varying controls at the annual frequency.

the government, command higher tuition, as suggested by the results in Table 2, column (4). Insofar as some component of quality is unobserved to the analyst but observed to schools and students, the identification is in peril, at least in theory. As expected, the treatment and the control groups are different in some dimensions, quality and tuition being the main ones. Table 4 shows the descriptive statistics of the treatment and control. Prior to the treatment, treated major-college pairs have higher CPC (quality), tuition, percentage of students with FIES, and percentage of faculty with doctoral degrees.

Restricting the sample to the major-college pairs with CPC 2 and 3 makes the treated and control units more similar on average. Table 5 shows the descriptive statistics of the treatment and control when we restrict the sample to CPC 2 and 3. Not surprisingly, differences in the abovementioned dimensions still arise but are much smaller.

We re-estimate the parameters in equation (1) restricting the sample to major-college pairs whose CPC score is 2 and 3 (the cutting off score for qualifying is 3). This sub-sample emulates a discontinuity approach. Table 6 shows the results which are, if anything, stronger.

We also implement 4 different propensity score procedures that make the treated and the control units as similar as possible on the observables. Table 7 contains the results. For most cases, estimates are smaller but still positve and mostly statisitcally (and economically) significant.

Accounting for observables does rule out the possibility that unosbervables factors drive results. Several reasons suggest that, in practice, is it plausible to assume that the treatment is exogenous. First, all time-invariant differences in quality across major-college pairs is account for by the fixed-effects.

Second, we do observe several dimensions of quality, such as the instructor/student ratio. Although we cannot dismiss the possibility entirely, biases from non-observable demand for quality should be mitigated by the inclusion several indicators of quality that are not accounted for in the measures quality computed by the Ministry of Education (the instruction - pupil ratio for example). In addition, if time-varying heterogeneity in quality was driving results, one would expect that the estimated treatment effect to change as we include additional measures. Inspection of Table 2 shows that this is not the case (compare columns (1) and (2)) with (3) and (4)).

Some colleges may have anticipated the ramp-up of FIES and may had been improving quality prior to 2010 in order to qualify. In this case, tuitions in eligible colleges could had been increasing, relative to non-eligible colleges, *prior* to 2010.

It is unlikely that this "anticipation" story is generating results spuriously. Quality is not easily adjusted in the short-run. One has to hire more instructors with higher qualifications, which takes time. The fact that we are looking at a short period - two years after the ramp-up - makes it more credible that unobserved changes in quality are not driving results. In addition, anecdotal evidence suggests FIES's expansion, although not a complete surprise, was not anticipated by market participants.[9]

Figure 3 shows the evolution of the ENADE grade over time. We computed the kernel estimate of the density function of the ENADE grade in every year from 2008 through 2011. We see no discernible changes from year to year. If colleges were boosted performance in anticipation of the FIES ramp-up, then we would expect a shift in the 2010 density. If anything, it seems grades dropped between 2008 and 2010. Nor one sees any disciple change in 2011. School did not improve quality a year after the ramp-up. Figure 4 and 5 depict the distribution of ENADE scores of the treatment and group groups, respectively.

[9] Sell-side reports provide an informative narrative of the attitude of market participants. See Itau's - the largest broker and distributor in Brazil - report from 2012.

VIsual inspection reveals that quality did not improve significanlty more in the treatment vis-à-vis the control group after 2010. Thus the differences in the trajectory of tuition does not seem to be due to a differential trend in the trajectory of quality post 2010 (at least not as measured by ENADE).

Financial data from the largest private player in Brazil also suggests that FIES was not at all anticipated by investors.

Figure 6 depicts Kroton's capital expenditures and market capitalization. Kroton, a listed company since 2007, is the private higher-education player in Brazil. In the years following the introduction of FIES, Kroton's aggresive expansion strategy would rely heavily on FIES.[10] If the company was expecting a boom from FIES, one would expect a surge in capital expenditures preceding in 2009 and 2010. Figure 4 shows no such surge. Investors do not seem to have anticipated any value in FIES. From the start of January 2008 through the end of 2010, a year after the chnages in FIES were implemented, market capitalization barely moved. Interestingly, the market capitalization of Kroton starts surging number of students covered by FIES increases sharply in 2012 and 2013. [11]

Stories from the supply side are less worrisome. Eligible and non-eligible major-college pairs may have different geographical distributions, and regional shocks to costs could produce the differential increase in tutions. But the regional distribution is similar. Eligible and non-eligible major-college pairs may had been expanding at different rates prior to 2010, and economies of scale may produce differences in tution prices after 2010 (Table 2 suggests the presence of economies of scale). However, the most reasonable story would be eligible major-college pairs expanding more rapididly prior to 2010, whcih would entail a *drop* in tutions relative to non-eligible after 2010. In any event, Figure 7 shows that the number of students enrolled in eligible and non-eligible major-college pairs was not following a different trajectory prior to 2010.

The claims imply that the pre-2010 trends of tuition in the control and the treatment groups were the same. We cannot test for similar pre-treatment trends using the main data because major-school level tuition information is only available for 2009 onwards. Alternatively, we use Census financial data, which is available for earlier years, but only at the college level.

The Census has information form the school's financial statements, including detailed revenue information on revenues from several sources. We use the *receita própria*, which are revenues from tuitions (instead of other fees or transfers of funds related to scholarships and tuition loans). We proxy the average tuition by dividing *receita própria* by the number of students enrolled. This proxy is imperfect because of composition effects. But there is no reason to think that the any composition effect would be different in the treatment and control groups (especially because there is no evidence of anticipation of the 2010 ramp-up in FIES) .

We classify college as treated if the proportion of eligible majors is above the median across institutions in 2010. Otherwise, it belongs to the control group. Figure 8 depicts the trajectory of *receita própria* per student from 2006 through 2012 for both the treatment and the control groups. We find no discernible difference in the trajectories between the two groups from 2006 through 2010.

We now perform the regression analysis at college level, which allows implement an

[10]The market capitalization is the value of the equity in the São Paulo Stock Exchange. By the market capitalization of equity criteria, Kroton was the most valuable private-sector listed university in world during the years 2013 and 2014. See the Itaú's sell-side report.

[11]We find the same conclusions if we look at other major listed private universities, such as Anhanguera and Estacio (results are available upon request).

additional robustness test, and to perform some placebo tests. We define treatment and control as a continuous variable that capture the intensity of FIES exposure at the college level: the proportion of majors that are eligible for FIES's loans. Because the data is at the college level, we can use the CPC quality assessment - a more direct determinant of FIES eligibility than ENADE - without loosing a significant amount of data. An additional advantage of using college-level data is that we can include additional controls.

A difference-in-differences analysis with continuous treatment is conducted. The dependent variable is the natural logarithm of *receita própria*. Table 8 presents the results. Column (1) has the main results. Again, the estimated coefficient of control variables have expected signs. The estimated impact FIES is again positive and statistically significant. magnitude of the estimated treatment effect in Table 8 is not comparable to the one in Table 2 because the treatment is now continuous.

The remaining columns of Table 8 contain estimates of several placebo experiments. In a nutshell, the exercises pretend the ramp-up occurred earlier than it actually did, effectively testing the presence of pre-2010 differential trends in tuition costs according to the degree of eligibility in 2010. If the treatment and control groups were following different trends prior to 2010, then one would find a "false" impact of FIES when performing the placebo exercises. We find no effect across the board (columns (2) through (7)), suggesting that prior different trends cannot explain the results in Table 8 column (1). In Table **??** we repeat the exercise and for most combinations of pre-treatment periods we find similar results. However, for one period combination we found a result that is significant at 10%. From a probabilistic standpoint, still, the results are consistent with our common trend assumption, since a rejection at 10 % is expected after numerous specifications.

6 Structural Form

The reduced form shows that the availability of FIES increases tuition. Now we investigate one possible mechanism behind this increase in tuition, which requires specifying a structural model. Several mechanisms may be operative. As long as some students are credit constrained, FIES increases the demand for tertiary education for a given level of tuition, i.e., cause a shift of the demand curve. In this case, tuitions increase if marginal costs are increasing.

But the demand may also rotate, i.e., FIES may change the demand tuition-elasticity of tertiary education. More specifically we expect FIES to reduce tuition-elasticity of demand. This may occur for several reasons. Evidence from real estate or car loans support the idea that, if gains from acquiring a good or service are sufficiently high, credit constrained individuals are less sensitive to the price of the good or service (Adams, Einav and Levin, 2009). In Brazil, gains from tertiary education are so large that the Net Present Value of tertiary education is still positive for a certain range of increases in tuition (Ferreira et al, 2014). Students may become price insensitive if they anticipate that they will not repay the debt in full because the government cannot credibly collect. Debt collection may be particularly problematic when aggregate shocks render delinquent a large fraction of borrowers (Farhi and Tirole, 2012). Of major, changes in demand tuition-elasticity can only affect tuitions if suppliers have some pricing power. We argue below that this is the case.

We document the mechanism by estimating the demand schedule structurally. Successful demand estimation yields two behavioral objects that are directly interpretable as the mechanisms we are interested in: the intercept interacted with FIES penetration - the shit in demand shit - and elasticity interacted with FIES penetration, which measures how demand tuition-elasticity depends on FIES penetration.

The Brazilian for-profit tertiary education section is characterized by the coexistence of large conglomerates - such as Kroton, the second largest market capitalization in world among educational companies - with numerous smaller institutions. Data from the 2012 School Census shows that the 10 largest groups had 20% of enrolled students at the national level. A little over half the institutions had less than 1,000 students. At the local level concentration is higher. For instance, in 2012, the 10 largest groups had 32% of enrolled students in the states of São Paulo and Rio de Janeiro, the largest and the third largest market respectively, 49 % in Mato Grosso do Sul and 61% in Rio Grande do Norte. There is a wide variability of quality, which suggests a vertical differentiation structure. In 2012 we observed a mean grade in ENADE, which can be considered a proxy for quality, of 2.6 with a considerable standard error of 0.75. Thus, although the market structure is not very concentrated at the national level, concentration is high locally. This suggests some pricing power.

Demand estimation in differentiated product markets faces two difficulties. First, the large number of elasticities and cross-elasticities. We deal with this difficulty using the discrete choice approach, a standard procedure. The second is endogeneity of prices, in our case tuition. We are able to include a large number of school - major characteristics in the our discrete choice model. Still, there are always factors, unobservable to us but observed by the school and by the students, that affect tuition. To deal with endogeneity we will use a modified version of the BLP instruments, as detailed below (BLP is after Berry, Levinsohn and Pakes, 1995; see also Berry, 1994; and Nevo, 2001).

We include FIES penetration at the major-school level as a component of the student's indirect utility. The presence of FIES at the school - major level increases the student indirect utility because it represents access to credit, and the possibility of going to school and doing additional consumption.

We model the indirect utility as a function of the major-school characteristics. Let $t = 1, ...T$ be T markets, and $k = 1, ..., K$ de K different major-school pairs, and $i = 1, \dots I$ be I consumers. We define a market as a state-year pair (there are 27 states). Student i's indirect utility if she goes to major-school k in market t, U_{ikt}, is given by:

$$\delta_{kt} \equiv X_{kt}\beta - \alpha p_{kt} + \omega FIES_{kt} + \lambda FIES_{kt} * p_{kt} + \xi_{kt} + \epsilon_{ikt} \tag{2}$$

$$U_{ikt} = \delta_{kt} + \varepsilon_{ikt} \tag{3}$$

where δ_{kt} is the mean utility from attending major-school k at market t, p_{kt} is the tuition of major-school k at market t. $FIES_{kt}$ is the fraction of major-school students financed with FIES. It is the degree of FIES availability at major-school k at market t. As we have seen, FIES availability is a function of eligibility at the major-school level, and also of the operational experience of the school with FIES, because the school process most of the paper and 'advertise' FIES to the students. α is the marginal effect of tuition on indirect utility. The interaction parameter λ capture how the marginal impact of tuition on the indirect utility changes with the availability of FIES.

Typically, one assumes that students and schools observe all the relevant major-school characteristics, but the econometrician does not. We call X_{kt} the vector of characteristics observed by the econometrician, and ξ_{kt} the vector of variable that, not observed by the econometrician, and nonetheless observed by the school and the student. ϵ_{kt} is a shock, observed only by the individual, that is individual - major - school specific.

The outside option - the choice of not choosing to go to college - completes the specification.[12]. We consider the total number of potential students that opted for the outside option as the difference between the number of 18 through 29 year-olds minus the number of enrolled students, both at the state level.

We assume students choose one major-school pair only, a reasonable assumption. We integrate out with respect to individual shock ϵ_{kt}. For the main results, Wwe will make the convenient assumption that ϵ_{ikt} is i.i.d. We further assume that ϵ_{ikt} follows a Type I extreme distribution. The i.i.d. hypothesis, plus the distributional assumption, turn the model into a multinomial Logit.

This assumption is not innocuous because it places *a priori* restrictions on the cross-elasticities. The i.i.d. assumption implies that the cross-elasticity between any two major-school pairs is driven almost exclusively by their markets shares (Berry, 1994). For this reason, we also present results from two models. The nested logit Logit model, in which we impose that students first choose the major and then the college. And the full random coefficients model, which places the fewest a priori restrictions. Results are available upon request.

For concreteness, derive the estimated equations for the the multinomial Logit case, which is convinient because it produces a closed-form formula for the market shares. The mean utility determines the market share of major-school k at market t, s_{kt}:

$$s_{kt} = \frac{exp(\delta_{kt})}{1 + \sum_{v=1}^{K} exp(\delta_{vt})} \tag{4}$$

The own-elasticity is given by:

$$\frac{\partial s_{kt} p_{kt}}{\partial p_{kt} s_{kt}} = (-\alpha + \lambda * FIES_{kt}) p_{kt} \, (1 - s_{kt}) \tag{5}$$

Let s_{0t} be the market share of the outside option. Following Berry (1994), we take logs on both sides of (4) and subtract the log of the outside of option on both sides:

$$ln(s_{kt}) - ln(s_{0t}) = X_{kt}\beta - \alpha p_{kt} + \omega FIES_{kt} + \lambda FIES_{kt} * p_{kt} + \xi_{kt} \tag{6}$$

Equation (6) is a linear regression model. ξ_{kt} is the error term. There two difficulties in estimating (6): measurement and endogeneity.

The market share s_{kt} is an observed quantum in (6). Measuring quantities demanded in this industry is not trivial. In Brazil, enrollment requires a high-school diploma and, typically passing entrance exams. Majors are declared at the entrance exams. There is excess vacancies for some major-school pairs, and all eligible applicants are approved. In this case, it is straightforward to measure demand by the number enrolled. However, a little more than half major-school pairs in the sample have more candidates than spots, in which case demand is rationed. For this reasons we measure quantities demanded by the number of applicants. This measure is less contaminated by supply restriction such as the limited number of spots per pair major-school.[13]

ξ_{kt} is (potentially) observed by the school and the students, and thus "priced into" the tuition p_{kt}. Many unobservables can affect student decisions and tuitions, such as convenient locations downtown, and advertising expenses. Because we do not observe ξ_{kt}, p_{kt} is endogenous. Identification demands finding sources of exogenous variation in tuitions, i.e., instruments for p_{kt} a in (6). It is crucial that we observe regulatory measures

[12]In fact, one may go to a public, free-of-charge university.

[13]We obtain qualitatively similar results using the number of enrolled students as a measure of quantity demand. Results are available upon request.

of quality, such as the grades on ENADE and the CPC, otherwise $FIES_{kt}$ would also have to be treated as endogenous. The ability to offer spots depends on accreditation by the Ministry of Education, and accreditation depends on meeting objective standards of quality; as we have seen, the penetration of FIES at the major-school level also depends on meeting (other) objective standards of quality. Although we observe these objective standards of quality, and control for them in (6), we still treat $FIES_{kt}$ as endogenous.[14] In summary, we need to instrument for p_{kt}, for $FIES_{kt}$, and for the interaction.

We use five instruments and their interactions. The first is inspired by the so-called BLP instruments. We divide major into 22 groups according to fields of knowledge, using the same classification as the Ministry of Education. For each market t, each major-school unit k belongs to field h. The instrument is the mean tuition in market k of majors in field h, excluding major k, Mean Tuition$_{-ht}$. This instrument captures shocks to the marginal cost of supplying major k. One such shock may be the scarcity of teachers in major k. More specifically, we assume that an increase in business school tuition contains information about the increase in the marginal cost of supplying education in economics, *but not information about the demand for the economics major.* In addition, we use two additional direct marginal cost instruments (supply shifters): the mean salary of higher education instructors and of administrative workers at the city-year level. In all three cases, the exclusion restriction is: changes in the tuition of related majors contain only supply but not demand information about major k. In other words, conditional on quality and other observables, shocks to the demand of major within a related area are not correlated. This identification hypothesis is not satisfied trivially. Suppose that in state x and year w, the demand for civil engineering was particularly high for unobservable reasons (for us the researchers). Does this tell us nothing about the unobserved component of the demand for architecture? Normally one would expect it would because enrollment in different fields would be partially driven by labour market conditions. We deal with the 'common unobserved demand' shocks by including market - field dummies. These dummies capture, for example, the fact that the real estate sector in state x during certain years was particularly buoyant, thus increasing the demand for civil engineering and architecture majors that year.

We take advantage of the rules for FIES eligibility, in the spirit of the reduced-form identification strategy. The FIES instrument is at the school level; it is a *dummy* that assumes the value 1 if that school had at least one student financed with FIES. It captures, albeit imperfectly, the fact to distinguish school eligible and non-eligible for FIES. The second FIES instrument is at the major - school level (the same as k); it is a dummy that equals 1 is that major in that school was eligible for FIES. The exclusion restriction is that, after controlling for observable levels of quality, whether the institution or the major at that institution is eligible for FIES does not enter directly into the students' indirect utility. In other words, we assume that the institution or a major being eligible for FIES matters only insofar as it increases the chances that the student can use FIES - arguably captured by the variable $FIES_{kt}$, the fraction of students in the major -school k that use FIES. The identification assumptions are similar to the ones in the reduced-form section. Finally, because we include the interaction between tution and FIES penetration, we also include the interactions of the first and the second set of instruments.

In some specifications we include a large set of controls. They most capture quality above and beyond the hard measures such as ENADE or CPC. We also include, besides the aforementioned interactions of market and year dummies, the interaction of school

[14] The section on the reduced-form contains a detailed discussion of the standards necessary to be part of the FIES program.

and year dummies. They capture for example unobserved advertising campaigns at the institution level that increase the demand for all majors of the institution.

Table 9 and 10 contains the first-stage results for the two endogenous variables: tution and FIES penetration. Instruments are strongly related to the endogenous variables in almost all specifications. In most cases, the sign of the estimated coefficients are as expected. Most importantly, $MeanTuition_{-ht}$ very significantly affect p_{kt} in the most complete specification (column 4); and the dummies are very significantly related to the interaction of Mean Tuition$_{-ht}$ and p_{kt}. Finally, instrument have the expected signs: Mean Tuition$_{-ht}$ is positively related to p_{kt}, and the dummies are positively related to the interaction. Both the

We estimate the parameters in equation (6) by two stage least squares (2SLS) clustering at the city level. Table 11 present the results. As expected, the coefficient associate with tuitions is always negative and statistically significant. Without FIES ($FIES_{kt} = 0$), higher tuitions reduce market shares. Interestingly, the Ordinary Least Squares (OLS) results (column 1) are much smaller in magnitude that its 2SLS counterpart (column 2-6) identification strategy is successful. Mostly, the omitted factors in ξ are intangible perceptions about quality. Thus, increases in tuition associated with unobserved increases in quality (ξ) will produce a much smaller estimated impact on market shares if one does not account for the unobserved ξ, which is the case of OLS. Using our preferred specification (column 4), the impact of a 10% deviation of mean tuition (around R$50, see table 1) causes a roughly a 17.5 percentage points change in market share.

More interestingly, the coefficient associated with interaction of p_{kt} and $FIES_{kt}$ is always positive when we estimate by 2SLS. This means that FIES reduces the demand tuition-elasticity. Using the most complete model (column 4), if 30% of the students receive FIES, then the market share becomes insensitive to changes in prices ($0.00487 * 0.3 \times 0.0164$). Admittedly, 30% is a very large number: the mean penetration was 8.26% in 2012. Thus, for the vast majority of major - school pairs, market shares drop with increases in tuition. But soon demand will become quite inelastic.

In Figure 9 we consider our preferred specification (column 4) and calculate how mean demand elasticity, calculated as in equation (5), evolves through time as the number of financed students increase. We also compute a 95% confidence interval through parametric bootstrap. We see in the graph that as FIES becomes more relevant through the years, there is a reduction in demand elasticity.

7 Discussion

Figure 10 depicts Net Income Margins (NIM) and Return on Assets (ROA) of Kroton. As expected, NIMs and ROAs move closely together (although NIMs are more volatile, again expected). NIMs and ROAs declined between 2008 and 2010, a consequence of the 2008 - 2009 financial crisis (profitabity could have suffered if Kroton was investing heavily in anticipation of FIES; Figure 6 shows this is not case). NIMs and ROAs reached the in mid 2010, a little after the start of the FIES ramp-up. ROAs and NIMs rose sharply thereafter, rise in line, reaching an impressive 18% in the second quarter of 2014, when FIES was expanding very rapidily.

Kroton, the major private player in Brazil, is a reflection of the industry: growth with expanding margins. This is compatible with the reduction in demand tuition-elastility, and also with a straight outward shift in demand. We perform a simple exercise to assess how much the estimated change in elasticity account for the changes in margins quantitatively.

Consider a simple static oligololistic pricing model, such as Cournot (Bresnahan, 1982).

$$Margin \equiv \frac{Tuition - MC}{Tuition} = \frac{1}{|\epsilon(FIES)| \times N} \tag{7}$$

where N is the number of effective competitors, ϵ is the elasticity as a function of FIES, and MC is the marginal cost. We take N and ϵ from Table 8, which contains information on the market structure and penetration of FIES at the relevant market level. The relevant market is the city - major pair. We compute averages weighting by the number of students at the city - major level. The weighting procedure replicates more closely the average margin at the industry level. For the elasticity and the impact of FIES on elasticity, we use the estimate on Table 7 column (6), the most complete structural model. Using (7) we compute the percentage change in the average industry margin before (2009 and 2010) and after FIES 2012) due to the reduction in the tution-elasticity (holding everything else constant):[15]

$$\frac{Margin_{AfterFIES} - Margin_{BeforeFIES}}{Margin_{BeforeFIES}} = \frac{\frac{1}{|\epsilon(FIES_{2012})| \times N_{2009}} - \frac{1}{|\epsilon(FIES_{2009})| \times N_{2009}}}{\frac{1}{|\epsilon(FIES_{2009})| \times N_{2009}}} \tag{8}$$

Substituing the figures from Table 12 into equation (8), we find

$$\frac{Margin_{FIES2012} - Margin_{FIES2009}}{Margin_{FIES2009}} = 2.09 \tag{9}$$

In 2009 and 2010 MINs were 4.9% on average. In 2012 they jumped to 14.4%. Thus, the average penetration of FIES is rsponsible for 56% of the increase in MINs through the reduced elasticity mechanism. If one accounts for the fact the number of effective players dropped at the relevant market level from 3.45 to 2.17, the pricing formula (7) accounts for all the percentage change in NIMs from 2009/2010 to 2012.

8 Conclusion

Using the large-scale FIES experiment, we document two facts. First, a reduced-form object: tuition increase will the availability of cheap subsidized student loans. Second, a structural object: increased availability of student loans reduce the tuition-elasticity of demand. Simple back of the envelope calculations suggest that the reduction in the tuition demand-elasticity responds for about half the increase in Net Income Margins for the largest private player in Brazil (Kroton).

These results are important for two reasons. Tuition inflation seems a widespread phenomenon, and concerns have been raised as to the sustainability of such programs in the US. Our results do not necessarily apply to the US but they informative. A related concern is with the efficiency of student lending. In countries like Brazil, credit markets are very inefficient and the tertiary education premium is historically high. Thus, policy makers in Brazil or Chile (a country that has a similar and older program) have hardly questioned whether these programs are welfare-enhancing. In Brazil, with the sharp reductions in tertiary education premium and the increases in tuition, soon enough will be time to question the expansion of FIES at the margin.

[15]The figure for the absolute margin is not comparable with the financial margins because it does not take into account fixed and quasi-fixed expenses, which enter into the Net Income Margin depicted in Figure 10.

9 References

ADAMS, W.; EINAV, L.; LEVIN, J. **Liquidity Constraints and Imperfect Information in Subprime Lending**, *American Economic Review,* 99(1), 49–84, 2009.

BECKER, G. S. **Human Capital and the Personal Distribution of Income: An Analytical Approach**, *Institute of Public Administration*, 1967.

BELLEY, P.; LOCHNER, L. **The changing role of family income and ability in determining educational achievement**, *Journal of Human Capital 1(1)*, p. 37-89, 2007.

BELLEY, P.; FRENETTE, M.; LOCHNER, L. **Post-secondary attendance by parental income in the U.S. and Canada: What role for financial aid policy?**, *NBER Working Paper 12*, 2014.

BERRY, S. T. **Estimating Discrete-Choice Models of Product Differentiation**, R*AND Journal of Economics*, 25(2), p. 242-262, Summer, 1994.

BERRY, S.; LEVINSOHN, J.; PAKES, A. **Automobile Prices in Market Equilibrium**, *Econometrica*, Econometric Society, 63(4), p. 841-90, 1995.

BERRY, S. T.; HAILE, P. A. **Nonparametric Identification of Multinomial Choice Demand Models with Heterogeneous Consumers**, *NBER Working Papers 15276*, 2009.

BRESNAHAN. **The Oligopoly Solution Concept is Identified**, *Economics Letters* 10, p. 87-92, 1982.

CAMERON, S.; HECKMAN, J. J. **Life cycle schooling and dynamic selection bias: Models and evidence for five cohorts of American males**, *Journal of Political Economy* 106(2), p. 262-333, 1998.

CARNEIRO, P.; HECKMAN, J. J. **The evidence on credit constraints in post-secondary Schooling**, *Economic Journal* 112(482), p. 705-734, 2002.

CELLINI, S. R.; GOLDIN, C. **Does Federal Student Aid Raise Tuition? New Evidence on For-Profit Colleges**, *NBER Working Papers 17827*, 2012.

DE MELLO, J.; GARCIA, M. **Bye, Bye Financial Repression, Hello Financial Deepening: The Anatomy of a Financial Boom**, *Quarterly Review of Economics and Finance*, 52(1), p. 135 - 153, 2012.

DYNARSKI, S. **Hope for Whom? Financial Aid for the Middle Class and Its Impact on College Attendance**, *NBER Working Paper 7756*, 2000.

DYNARSKI, S. **Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion**, *American Economic Review,* 93(1), 279–288, 2003.

FERREIRA, F.; FIRPO, S.; MESSINA, J. **A More Level Playing Field? Explaining**

the Decline in Earnings Inequality in Brazil, 1995-2012, *IRIBA Working Paper 17218*, 2011.

FARHI,E.; TIROLE, J. **Collective Moral Hazard, Maturity Mismatch, and Systemic Bailouts**, *American Economic Review,* 102(1), 60–93, 2012.

HOXBY, C. M. **How the Changing Market Structure of U.S. Higher Education Explains College Tuition**, N*BER Working Paper 6323*, 1997.

KANE, T. J. **College Entry by Blacks since 1970: The Role of College Costs, Family Background, and the Returns to Education**, *Journal of Political Economy*, 102(5), p. 878-911, 1994.

KANE, T. J. **Rising Public College Tuition and College Entry: How Well Do Public Subsidies Promote Access to College?**, *NBER Working Paper 5164*, 1995.

KANE, T. J. **A Quasi-Experimental Estimate of the Impact of Financial Aid on College-Going**, *NBER Working Paper 9703*, 2003.

LOCHNER, L. J.; MONGE-NARANJO, A. **The Nature of Credit Constraints and Human Capital**, *NBER Working Papers 13912*, 2008.

LOCHNER, L. J.; MONGE-NARANJO, A. **Credit Constraints in Education**, *NBER Working Papers 17435*, 2011.

LONG, B. T. **How do Financial Aid Policies affect Colleges? The Institutional Impact of the Georgia HOPE Scholarship**. *Journal of Human Resources*, 39(3), 2004.

LONG, B. T. ; RILEY, E. K. **Financial Aid: A Broken Bridge to College Access?**, *Harvard Educational Review*, 2007.

LONG, B. T. **What Is Known About the Impact of Financial Aid? Implications for Policy**. *National Center for Postsecondary Education Working Paper*, 2008.

LOVENHEIM, M. F. **The effect of liquid housing wealth on college enrollment**, *Working Paper,* 2011.

NEVO, A. **A Practitioner's Guide to Estimation of Random-Coefficients Logit Models of Demand**, *Journal of Economics & Management Strategy, Wiley Blackwell,* 9(4), p. 513-548, 2000.

NEVO, A. **Measuring Market Power in the Ready-to-Eat Cereal Industry**, *Econometrica*, Econometric Society, 69(2), p. 307-42, 2001.

NEVO, A. **Mergers with Differentiated Products: The Case of Ready-to-Eat Cereal**, *Finance* 0303004, EconWPA, 2003.

PELTZMAN, S. **The Effect of Government Subsidies-in-Kind on Private Expendi-**

tures: The Case of Higher Education, *Journal of Political Economy*, 81(1), p. 1-27, 1973.

SCHAPIRO, M.; MCPHERSON, M. S. **Financing Undergraduate Education Designing National Policies**. *National Tax Journal.* 50(3), p.557-571, 1997.

SCHAPIRO, M.; MCPHERSON, M. S. ; WINSTON, G. C. **Recent Trends in U.S. Higher Education Costs and Prices: The Role of Government Funding**. *American Economic Review Papers and Proceedings.* 79(2), p. 253-257, 1989.

RAU, T; ROJAS, E.; URZUA, S.; . **Loans for Higher Education: Does the Dream Come True?**, *NBER Working Papers 19138*, 2013.

A Figures

Figure 1: FIES - New Loans.

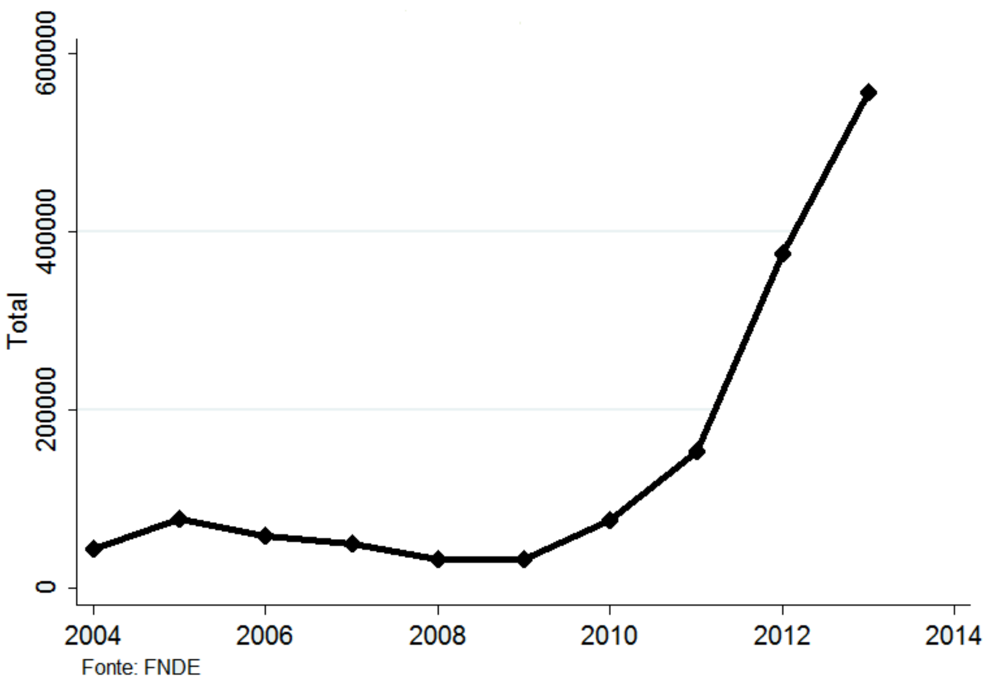


Figure 2: FIES - Government Expenses - millions of reais.

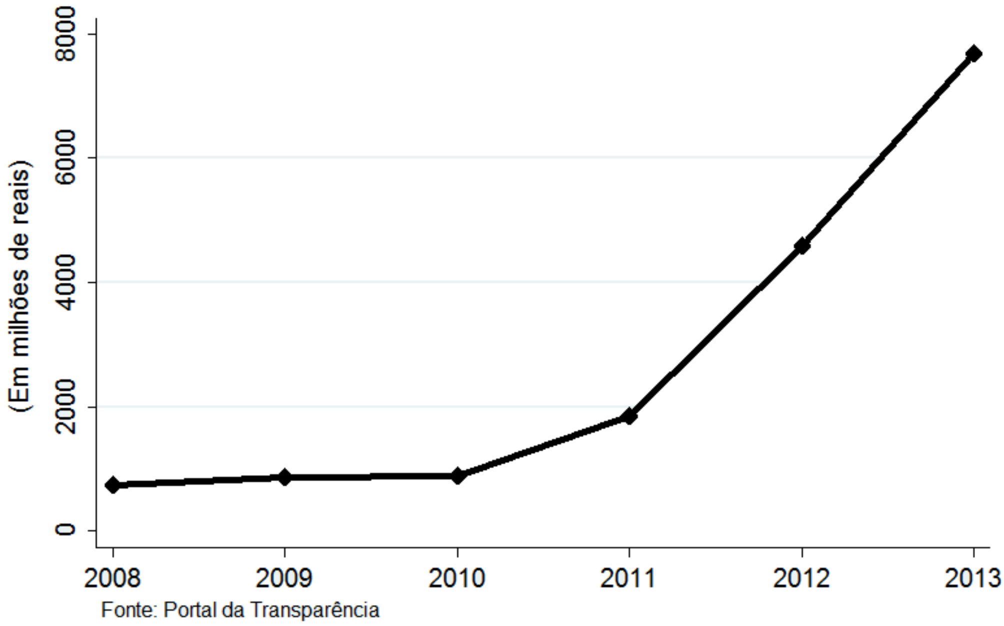


Figure 3: ENADE - Kernel Density.

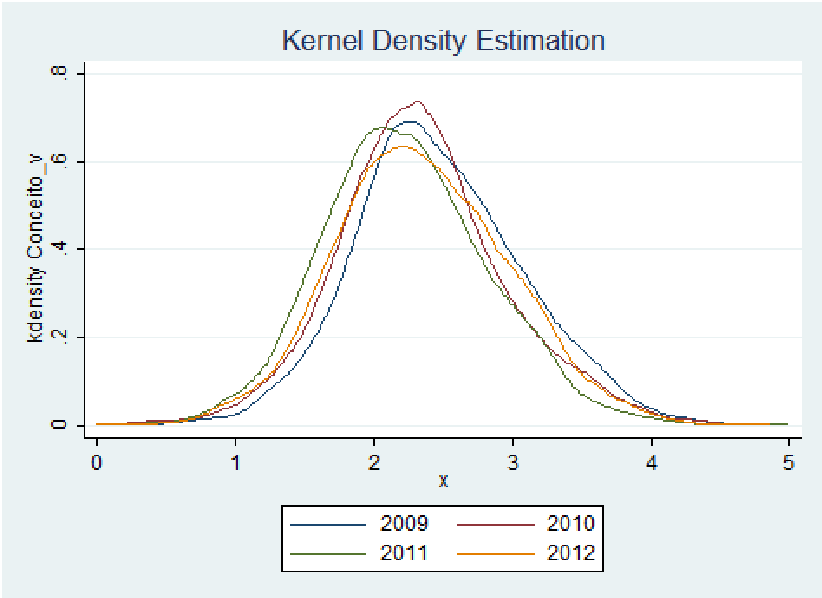


Figure 4: ENADE - Kernel Density - Treatment Group, 2009, 2011 and 2012

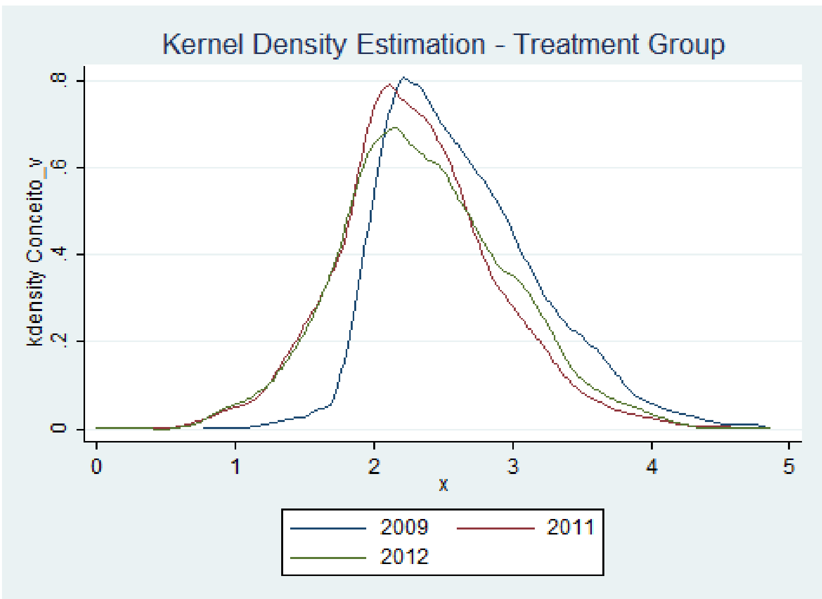


Figure 5: ENADE - Kernel Density - Control Group, 2009, 2011 and 2012

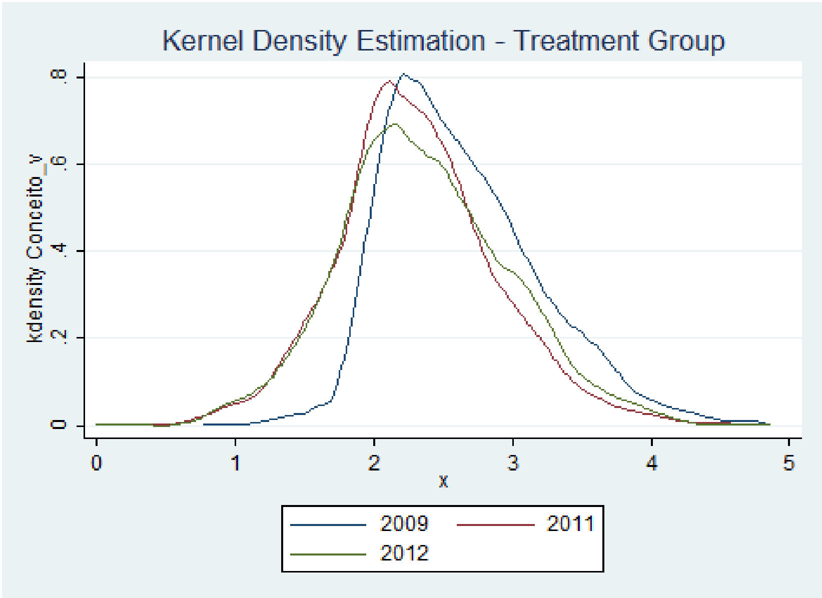
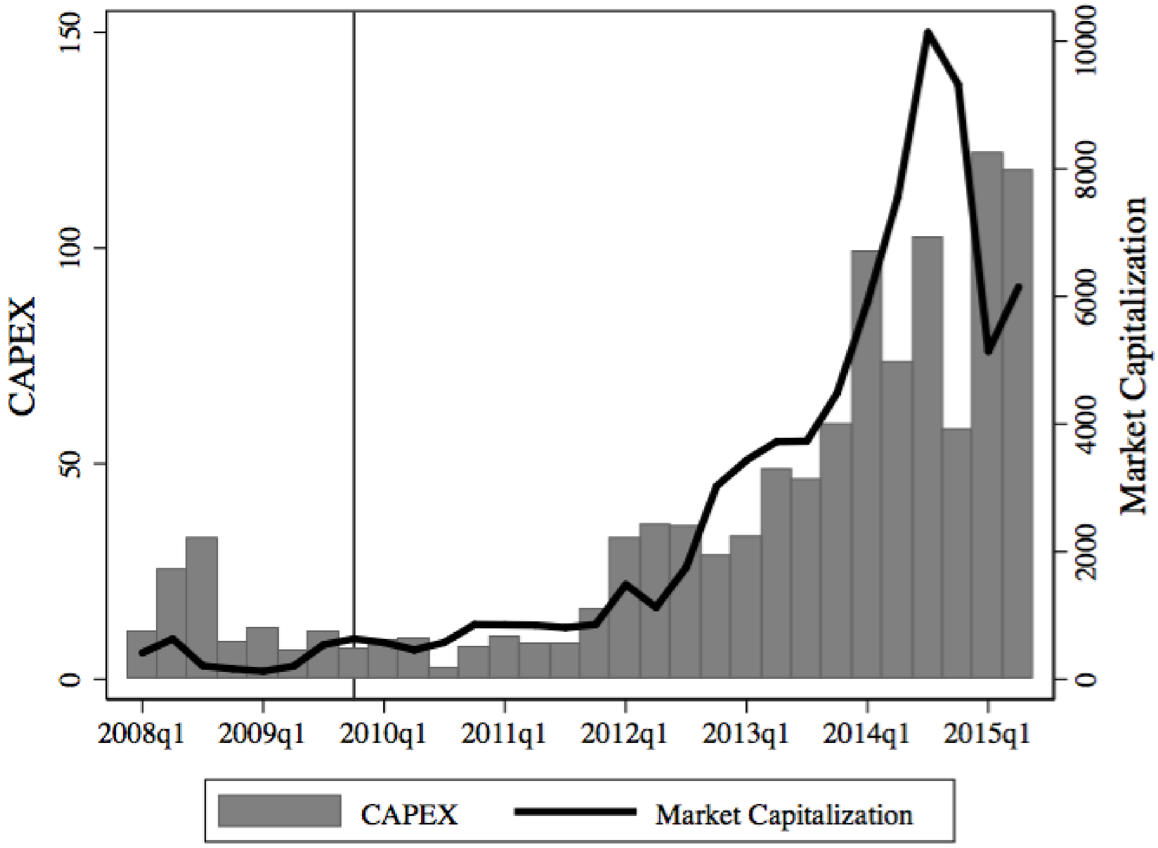


Figure 6: Kroton: Market Capitalization and Capital Expenditures in USD million



Source: Bloomberg and Economática

Figure 7: Enrolled Students, Treatment and Control

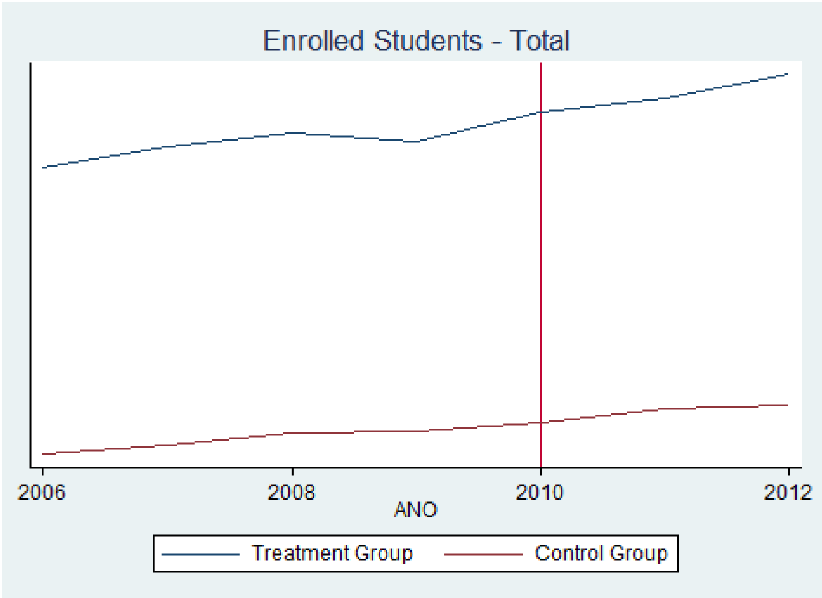


Figure 8: Log Revenue per Student.

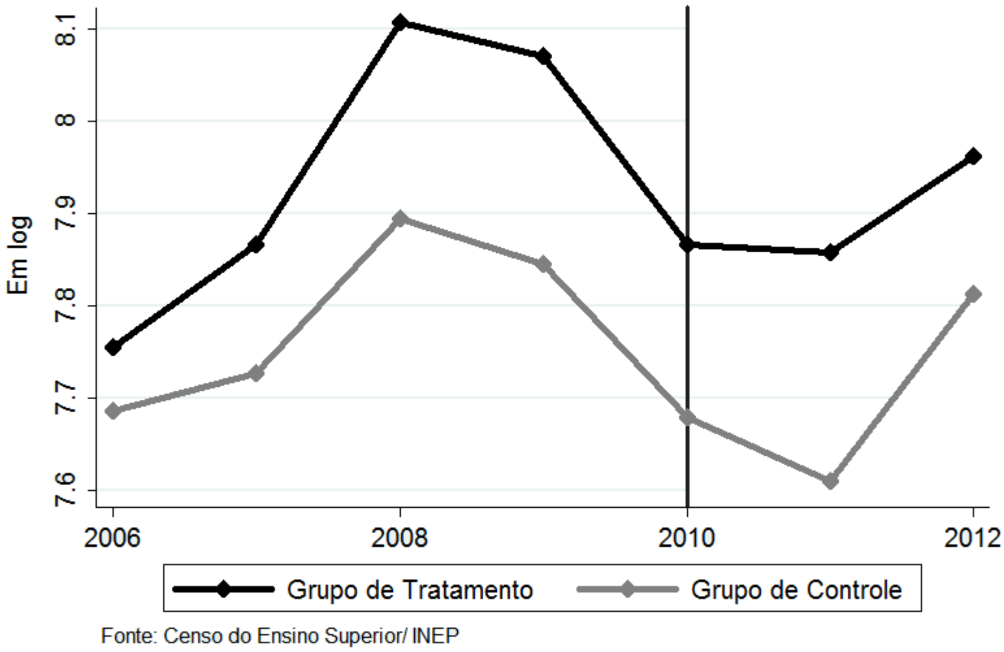


Figure 9: Mean Elasticity.

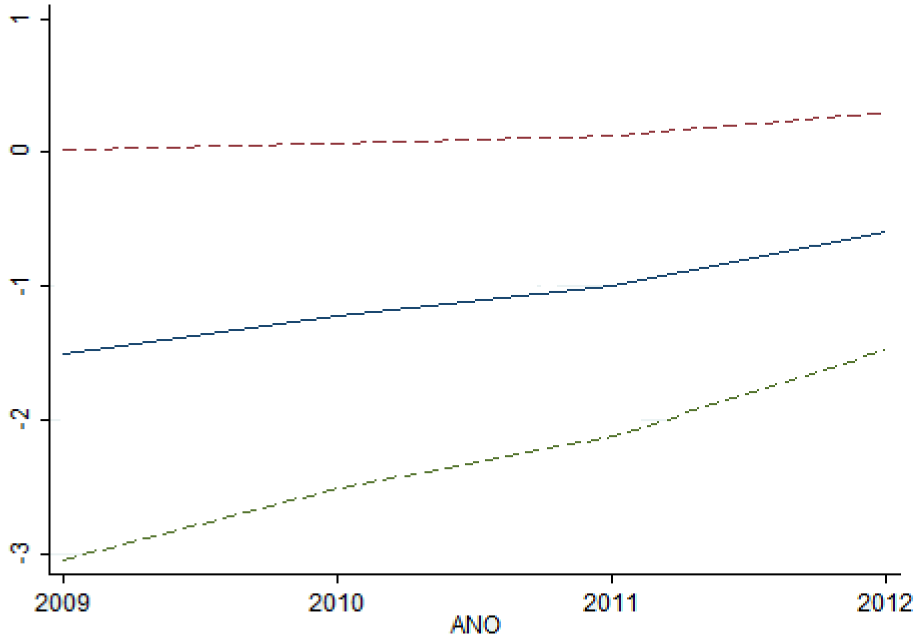
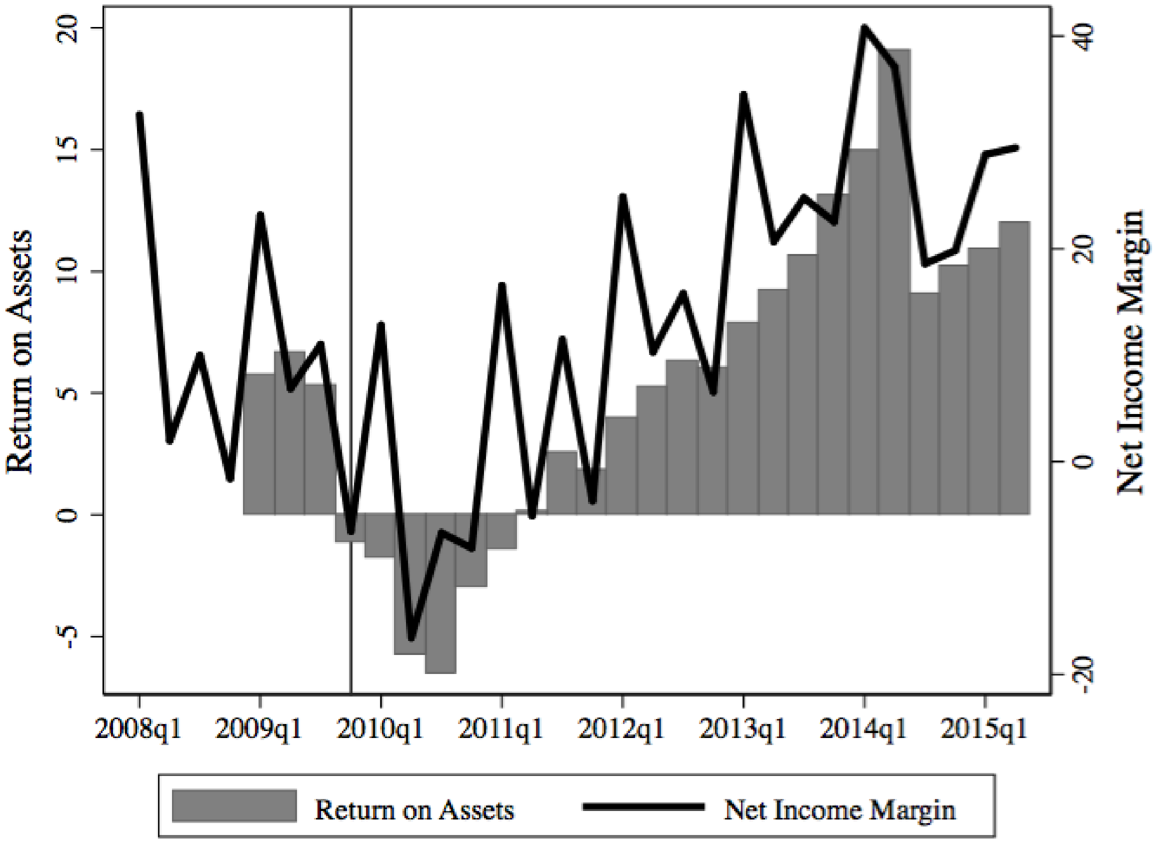


Figure 10: Kroton: Return on Assets and Net Income Margim in Percentage Points



Source: Bloomberg

B Tables

Table 1: Descriptive Statistics

Variáveis	Complete Sample 2009	Complete Sample 2010	Complete Sample 2011	Complete Sample 2012	majors in Treatment Group 2009-2012	majors in Control Group 2009-2012
Tuition (2008 reais)	539.6	512.6	507.5	523.1	522.5	511.7
	(284.6)	(308.4)	(308.2)	(292.1)	(321.0)	(270.6)
Number of students financed through FIES in the major	7.343	11.63	14.31	25.14	16.46	11.00
	(26.54)	(35.57)	(40.68)	(61.83)	(47.94)	(32.48)
Proportion of students financed though FIES in the major	0.0231	0.0350	0.0477	0.0826	0.0479	0.0430
	(0.0640)	(0.0739)	(0.0878)	(0.115)	(0.0928)	(0.0814)
Grade on ENADE	2.623	2.576	2.562	2.614	2.742	2.400
	(0.640)	(0.659)	(0.697)	(0.753)	(0.569)	(0.775)
Number of enrolled students in the major	258.5	278.5	257.4	274.9	296.1	223.3
	(392.3)	(398.7)	(356.8)	(380.3)	(417.9)	(310.8)
Number of new students in the major	97.64	94.17	84.85	107.4	105.1	77.66
	(147.5)	(139.0)	(120.8)	(140.2)	(145.9)	(115.2)
Number of graduating students in the major	43.09	43.59	42.23	45.45	46.60	38.70
	(69.07)	(73.83)	(63.33)	(66.23)	(74.40)	(56.50)
Applicant students to maximum class size ratio per major	1.684	1.519	1.713	1.887	1.811	1.524
	(12.68)	(2.772)	(3.473)	(3.359)	(3.467)	(9.092)
Number of students financed through higher education institution programs	2.569	2.133	2.712	3.208	2.515	2.801
	(16.42)	(14.65)	(17.43)	(18.71)	(16.31)	(17.59)
Number of majors	78.59	82.62	82.29	149.4	92.86	94.37
	(162.4)	(165.3)	(176.6)	(260.6)	(183.4)	(201.1)
Number of students with scholarship	30.45	38.74	47.71	46.30	47.80	33.52
	(110.1)	(127.4)	(141.3)	(140.5)	(135.8)	(126.6)
Number of administrative staff	788.7	716.3	713.2	1,245	822.2	825.3
	(1,745)	(1,374)	(1,470)	(2,096)	(1,551)	(1,771)
Professor student ratio	0.0349	0.0327	0.0405	0.0225	0.0287	0.0422
	(0.0523)	(0.0952)	(0.159)	(0.0227)	(0.0652)	(0.155)
Observations	6,816	13,808	13,808	5,928	19,487	13,983

Standard errors in parenthesis

Table 2: Reduced Form Estimation: Difference-in-Differences

DD Estimation - log(Tuition in 2008 Reais)

VARIABLES	(1) DD	(2) DD	(3) DD	(4) DD	(5) DD	(6) DD
Treatment effect - (FIES x Dt)	0.0786***	0.0760**	0.149***	0.0775***	0.0673***	0.0610***
	(0.0301)	(0.0299)	(0.0240)	(0.0183)	(0.0178)	(0.0160)
Enrolled Students (Total)[1]				4.28e-05	1.63e-05	3.51e-05***
				(3.34e-05)	(1.43e-05)	(1.27e-05)
Applicant Students to Max Class Size (Ratio)[1]				0.0345***	0.0346***	0.0336***
				(0.00246)	(0.00247)	(0.00259)
Major-HEI Quality Assessment - Grade				0.148***	0.0814***	0.0689***
				(0.0173)	(0.0121)	(0.0113)
HHI - Field of Study					-0.0123	-0.0151
					(0.0266)	(0.0229)
Faculty Quality[2] *					0.640***	0.608***
					(0.0624)	(0.0899)
Degrees (Total)[2]					-0.000467	-0.000338
					(0.000525)	(0.000584)
Administrative Staff (Total)[2]					0.000109	0.000114
					(7.80e-05)	(7.17e-05)
Faculty (Total)[2]					-4.17e-05	-6.78e-05
					(0.000134)	(0.000128)
Dt	-0.121***					
	(0.0295)					
Constant	6.250***	6.294***	6.228***	5.834***	5.610***	5.499***
	(0.0192)	(0.0202)	(0.215)	(0.161)	(0.177)	(0.186)
Observations	17,945	17,945	17,945	17,945	17,945	17,945
R-squared	0.004	0.008	0.321	0.433	0.489	0.594
Year FE	n	y	y	y	y	y
Field of Study FE	n	n	y	y	y	y
City FE	n	n	n	n	n	y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Reduced Form Estimation: Monopoly Markets

DD Estimation - Monopoly (Field of Study)

VARIABLES	(1) DD	(2) DD	(3) DD	(4) DD	(5) DD	(6) DD
Treatment effect - (FIES x Dt)	0.000878	0.00305	0.143***	0.0890*	0.0715	0.0764**
	(0.0870)	(0.0855)	(0.0530)	(0.0489)	(0.0444)	(0.0348)
Enrolled Students (Total)[1]				8.38e-05	3.27e-05	-2.87e-05
				(5.34e-05)	(5.39e-05)	(8.40e-05)
Applicant Students to Max Class Size (Ratio)[1]				0.0122*	0.0156**	0.0176***
				(0.00649)	(0.00685)	(0.00591)
Major-HEI Quality Assessment - Grade				0.116***	0.0666***	0.0316**
				(0.0207)	(0.0155)	(0.0133)
HHI - Field of Study					0.0506	0.180**
					(0.118)	(0.0749)
Faculty Quality[2] *					0.453***	0.217***
					(0.0701)	(0.0806)
Degrees (Total)[2]					-0.000491	-0.000747***
					(0.000327)	(0.000260)
Administrative Staff (Total)[2]					3.47e-05	4.46e-05*
					(5.56e-05)	(2.43e-05)
Faculty (Total)[2]					2.27e-05	3.25e-05
					(6.07e-05)	(2.51e-05)
Dt	-0.0155					
	(0.0824)					
Constant	6.223***	6.316***	6.543***	6.348***	6.056***	5.504***
	(0.0274)	(0.0829)	(0.168)	(0.178)	(0.191)	(0.188)
Observations	2,090	2,090	2,090	2,090	2,090	2,090
R-squared	0.000	0.014	0.508	0.541	0.577	0.852
Year FE	n	y	y	y	y	y
Field of Study FE	n	n	y	y	y	y
City FE	n	n	n	n	n	y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Descriptive Statistics: Treatment and Control

Descriptive Statistics			
Variable	Treated - pre FIES	Control - pre FIES	Mean Diff - pvalue
Tuition (in 2008 Reais)[1] - Mean	580	515	3.17e-07
Tuition (in 2008 Reais)[1] - StDev	315	322	
Enrolled Students (Total)[1] - Mean	459	303	5.85e-10
Enrolled Students (Total)[1] -StDev	649	362	
Students with FIES loan (Total)[1] - Mean	18	8	1.13e-07
Students with FIES loan (Total)[1] -StDev	48	34	
% Students with Fies loan [1] - Mean	3.6	2.2	1.47e-08
% Students with Fies loan [1] - StDev	6.2	5.0	
Quality Indicator[1] - Mean	2.6	1.6	0
Quality Indicator[1] - StDev	0.5	0.4	
Applicant Students to Max Class Size [1] - Mean	1.73	1.55	.0806184
Applicant Students to Max Class Size [1] - StDev	2.99	2.18	
Faculty Quality[2] * - Mean	0.62	0.53	1.12e-21
Faculty Quality[2] * - StDev	0.16	0.17	
Degrees (Total)[2] - Mean	76	82	0.25
Degrees (Total)[2] - StDev	137	176	
Observations	3244	1012	

Table 5: Descriptive Statistics: Treatment and Control, Only CPC 2 and 3

Descriptive Statistics - Reduced Sample

Variable	Treated - pre FIES	Control - pre FIES	Mean Diff - pvalue
Tuition (in 2008 Reais)[1] - Mean	551	517	0.003
Tuition (in 2008 Reais)[1] - StDev	291	326	
Enrolled Students (Total)[1] - Mean	441	307	1.80e-08
Enrolled Students (Total)[1] - StDev	607	367	
Students with FIES loan (Total)[1] - Mean	15	9	.0000211
Students with FIES loan (Total)[1] - StDev	40	35	
% Students with Fies loan [1] - Mean	3.4	2.3	2.87e-06
% Students with Fies loan [1] - StDev	6.3	5.0	
Quality Indicator[1] - Mean	2.40	1.72	0
Quality Indicator[1] - StDev	0.31	0.36	
Applicant Students to Max Class Size [1] - Mean	1.70	1.56	.18
Applicant Students to Max Class Size [1] - StDev	3.14	2.20	
Faculty Quality[2] * - Mean	0.59	0.54	2.17e-14
Faculty Quality[2] * - StDev	0.15	0.17	
Degrees (Total)[2] - Mean	78	80	0.59
Degrees (Total)[2] - StDev	143	173	
Observations	2569	970	

Table 6: Reduced Form Estimation: CPC 2 and 3

DD Estimation - log(Tuition in 2008 Reais) - Reduced Sample

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	DD	DD	DD	DD	DD	DD
Treatment effect - (FIES x Dt)	0.110***	0.109***	0.161***	0.104***	0.0911***	0.0872***
	(0.0344)	(0.0339)	(0.0299)	(0.0216)	(0.0188)	(0.0177)
Enrolled Students (Total)[1]				1.70e-05	2.04e-06	2.02e-05*
				(2.62e-05)	(1.36e-05)	(1.08e-05)
Applicant Students to Max Class Size (Ratio)[1]				0.0315***	0.0323***	0.0301***
				(0.00344)	(0.00360)	(0.00377)
Major-HEI Quality Assessment - Grade				0.131***	0.0805***	0.0641***
				(0.0232)	(0.0182)	(0.0150)
HHI - Field of Study					0.0197	-0.0378
					(0.0389)	(0.0443)
Faculty Quality[2] *					0.594***	0.582***
					(0.0770)	(0.102)
Degrees (Total)[2]					-0.000344	-5.91e-06
					(0.000462)	(0.000473)
Administrative Staff (Total)[2]					7.69e-05	8.54e-05
					(7.82e-05)	(6.71e-05)
Faculty (Total)[2]					-3.13e-05	-7.45e-05
					(0.000129)	(0.000114)
Dt	-0.0740***					
	(0.0275)					
Constant	6.205***	6.152***	5.614***	5.348***	5.012***	5.068***
	(0.0198)	(0.0360)	(0.186)	(0.177)	(0.149)	(0.118)
Observations	7,028	7,028	7,028	7,028	7,028	7,028
R-squared	0.007	0.010	0.363	0.446	0.489	0.577
Year FE	n	y	y	y	y	y
Field of Study FE	n	n	y	y	y	y
City FE	n	n	n	n	n	y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Propensity Score Matching Procedures

Propensity Score Matching - log(Tuition)

	(1)	(2)	(3)	(4)	(5)	(6)
	Treatment 2011 x Baseline 2009	Treatment 2011 x Baseline 2010	Treatment 2012 x Baseline 2009	Treatment 2012 x Baseline 2010	Treatment 2013 x Baseline 2009	Treatment 2013 x Baseline 2010
Nearest neighbor matching	0.0147	0.0236*	0.0463**	-0.0133	0.0401***	0.0187
	(0.0145)	(0.0140)	(0.0195)	(0.0206)	(0.0151)	(0.0157)
5-nearest neighbors matching	0.0288**	0.0261**	0.0444***	0.00916	0.0429***	0.0199
	(0.0116)	(0.0110)	(0.0165)	(0.0186)	(0.0126)	(0.0127)
Kernel matching	0.0290**	0.0304***	0.0469***	0.0377***	0.0504**	0.0323**
	(0.0115)	(0.0101)	(0.0157)	(0.0145)	(0.0113)	(0.0132)
Local linear regression matching	0.0155	0.0114	0.0390*	0.0345**	0.0439***	0.0288*
	(0.0113)	(0.0122)	(0.0202)	(0.0159)	(0.0121)	(0.0150)
Observations	12,162	12,283	5,655	5,694	11,058	11,244

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Reduced Form - Robustness

	Robustness Check						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	2006						
	2007						
	2008	2007					2010 vs 2009
	2009	2006 vs 2010	2007				2008
	2010 vs 2011	2009	2006 vs 2009	2007 vs 2009			2007
VARIABLES	2012	2008	2008	2008	2007 vs 2008	2007 vs 2006	2006
Treatment effect - (FIES x Dt)	0.124*	0.0284	0.0214	0.0457	-0.0409	0.0666	0.0598
	(0.0702)	(0.101)	(0.112)	(0.138)	(0.166)	(0.129)	(0.0946)
Dt	-0.0493	0.0165		0.134	0.242**	0.0129	0.00299
	(0.0585)	(0.0725)		(0.0885)	(0.104)	(0.0874)	(0.0671)
Enrolled Students	-3.18e-05***	-2.65e-05***	-2.78e-05***	-2.62e-05**	-3.09e-05**	-2.48e-05**	-2.64e-05***
	(6.75e-06)	(7.89e-06)	(8.93e-06)	(1.15e-05)	(1.41e-05)	(1.03e-05)	(7.89e-06)
Applicant Students to Max Class Size (Ratio)	0.0388***	0.0432***	0.0441***	0.0257**	0.105***	0.111***	0.0432***
	(0.00772)	(0.00925)	(0.0106)	(0.0114)	(0.0277)	(0.0185)	(0.00925)
Faculty Quality	0.481***	0.624***	0.618***	0.632***	0.511**	0.501***	0.625***
	(0.0838)	(0.0998)	(0.111)	(0.147)	(0.200)	(0.127)	(0.0990)
Majors - Total	-0.00402**	-0.00453**	-0.00509**	-0.00121	-0.00227	-0.00667***	-0.00456**
	(0.00159)	(0.00188)	(0.00210)	(0.00299)	(0.00376)	(0.00241)	(0.00188)
Administrative Staff (Total)	0.000574***	0.000534***	0.000538***	0.000615***	0.000572	0.000377*	0.000532***
	(0.000132)	(0.000154)	(0.000174)	(0.000217)	(0.000351)	(0.000220)	(0.000154)
Faculty (Total)	0.000959***	0.000889***	0.000968***	0.000448	0.000782*	0.00127***	0.000893***
	(0.000180)	(0.000205)	(0.000227)	(0.000301)	(0.000411)	(0.000256)	(0.000205)
Constant	7.394***	7.333***	7.339***	7.420***	7.355***	7.303***	7.331***
	(0.0512)	(0.0587)	(0.0633)	(0.0800)	(0.105)	(0.0691)	(0.0574)
Observations	8,932	6,504	5,180	4,108	2,651	3,723	6,504
R-squared	0.037	0.044	0.049	0.032	0.078	0.086	0.044
Number of CO_IES	1,955	1,948	1,943	1,887	1,870	1,931	1,948

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
College and year fixed effects included

Table 9: First Stage: Tuition

	(1)	(2)	(3)	(4)	(5)
Tuition (in 2008 Reais)[1]					
Enrolled Students (Total)[1]				0.0320***	0.0179**
				(0.00781)	(0.00847)
Applicant Students to Max Class Size (Ratio)[1]				36.85***	37.12***
				(5.235)	(5.216)
Faculty Quality[2] *					287.4***
					(56.58)
Degrees (Total)[2]					-0.518***
					(0.0841)
Administrative Staff (Total)[2]					0.0571***
					(0.0199)
Faculty (Total)[2]					-0.00693
					(0.0162)
Mean Wage Faculty[3]	0.0424**	0.0446**	0.0217**	0.0170**	0.0207**
	(0.0170)	(0.0174)	(0.0101)	(0.00799)	(0.00925)
Mean Wage Administrative Staff[3]	-0.00577	-0.00379	-0.0123	-0.0244*	-0.0341***
	(0.0239)	(0.0249)	(0.0133)	(0.0139)	(0.0107)
(Average Tuition)$^3_{-ht}$	0.270**	0.234**	0.375***	0.346***	0.236***
	(0.108)	(0.111)	(0.0701)	(0.0620)	(0.0630)
Higher Education Institution Qualified for FIES (dummy)[2]	51.65	48.34	-88.57*	-97.16**	-112.0***
	(57.68)	(57.64)	(45.76)	(46.55)	(39.74)
dummyCURSO_HAB	-87.27	-96.18	-91.64**	-100.5**	-97.73***
	(60.32)	(60.31)	(44.89)	(39.93)	(36.21)
$((AvgTuition)^3_{-ht})x(HEIQualifiedforFIES(dummy)^2)$	0.0852	0.100	0.214***	0.239***	0.230***
	(0.101)	(0.105)	(0.0711)	(0.0663)	(0.0579)
$((AvgTuition)^3_{-ht}) \times (DegreeQualifiedforFIES(dummy)^1)$	0.139	0.140	0.162**	0.171***	0.150***
	(0.0918)	(0.0923)	(0.0654)	(0.0579)	(0.0532)
$(MeanWageFaculty^3) \times (HEIQualifiedforFIES(dummy)^2)$	-0.0121	-0.0123	-0.0159	-0.0146	-0.0196
	(0.0244)	(0.0245)	(0.0165)	(0.0138)	(0.0150)
$(MeanWageFaculty^3) \times (DegreeQualifiedforFIES(dummy)^1)$	-0.00735	-0.00674	0.000404	0.00409	-0.00142
	(0.0191)	(0.0189)	(0.0144)	(0.0107)	(0.00943)
$(MeanWageAdmStaff^3) \times (HEIQualifiedforFIES(dummy)^2)$	0.00162	0.00150	0.0132	0.00338	0.0215
	(0.0553)	(0.0556)	(0.0318)	(0.0338)	(0.0247)
$(MeanWageAdmStaff^3) \times (DegreeQualifiedforFIES(dummy)^1)$	0.0570	0.0594	0.0480*	0.0413	0.0385
	(0.0412)	(0.0413)	(0.0285)	(0.0263)	(0.0237)
Constant	227.6***	225.1***	329.0*	355.4*	255.4
	(36.35)	(35.33)	(194.8)	(194.4)	(204.9)
Year Fixed Effects	n	y	y	y	y
Major Fixed Effects	n	n	y	y	y
Observations	14,345	14,345	14,345	14,345	14,345
R-squared	0.067	0.069	0.314	0.457	0.485

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: First Stage: FIES Penetration

	(1)	(2)	(3)	(4)	(5)	(6)
	Students with Fies loan to Enrolled Students Ratio [1]					
Enrolled Students (Total)[1]				2.52e-06	2.08e-06	
				(3.58e-06)	(2.86e-06)	
Applicant Students to Max Class Size (Ratio)[1]				0.00404***	0.00407***	
				(0.000692)	(0.000684)	
Faculty Quality[2] *					0.0107	
					(0.0117)	
Degrees (Total)[2]					-4.79e-05	
					(3.30e-05)	
Administrative Staff (Total)[2]					1.80e-05***	
					(4.74e-06)	
Faculty (Total)[2]					-1.29e-05***	
					(3.39e-06)	
Mean Wage Faculty[3]	1.23e-08	-1.59e-06	-3.61e-06	-4.10e-06	-3.42e-06	
	(1.63e-06)	(1.95e-06)	(2.44e-06)	(2.54e-06)	(2.45e-06)	
Mean Wage Administrative Staff[3]	8.37e-06*	4.19e-06	4.13e-06	2.87e-06	2.57e-06	
	(5.07e-06)	(4.00e-06)	(4.53e-06)	(4.66e-06)	(5.04e-06)	
(Average Tuition)$^3_{-ht}$	-3.04e-05	7.62e-06	2.47e-05	2.14e-05	1.54e-05	
	(1.96e-05)	(1.93e-05)	(2.18e-05)	(2.18e-05)	(2.28e-05)	
Higher Education Institution Qualified for FIES (dummy)[2]	0.0644***	0.0734***	0.0546***	0.0536***	0.0525***	
	(0.0135)	(0.0143)	(0.0139)	(0.0136)	(0.0136)	
dummyCURSO_HAB	0.0191	0.0255**	0.0262**	0.0252**	0.0254**	
	(0.0126)	(0.0124)	(0.0124)	(0.0124)	(0.0128)	
$((AvgTuition)^3_{-ht})x(HEIQualifiedforFIES(dummy)^2)$	1.31e-05	-8.58e-06	1.17e-05	1.46e-05	1.18e-05	
	(3.14e-05)	(3.13e-05)	(3.17e-05)	(3.12e-05)	(3.19e-05)	
$((AvgTuition)^3_{-ht}) \times (DegreeQualifiedforFIES(dummy)^1)$	3.03e-05	2.82e-05	3.11e-05	3.21e-05	3.19e-05	
	(3.21e-05)	(3.06e-05)	(2.93e-05)	(2.93e-05)	(2.95e-05)	
$(MeanWageFaculty^3) \times (HEIQualifiedforFIES(dummy)^2)$	3.01e-06	1.85e-06	4.94e-07	6.38e-07	-1.12e-07	
	(3.87e-06)	(4.15e-06)	(4.15e-06)	(3.90e-06)	(3.91e-06)	
$(MeanWageFaculty^3) \times (DegreeQualifiedforFIES(dummy)^1)$	-2.33e-07	-8.73e-07	-4.90e-07	-1.01e-07	-5.71e-07	
	(2.59e-06)	(2.59e-06)	(2.30e-06)	(2.25e-06)	(2.17e-06)	
$(MeanWageAdmStaff^3) \times (HEIQualifiedforFIES(dummy)^2)$	-1.68e-05*	-1.76e-05*	-1.64e-05*	-1.74e-05*	-1.50e-05	
	(9.76e-06)	(9.93e-06)	(9.59e-06)	(9.27e-06)	(9.16e-06)	
$(MeanWageAdmStaff^3) \times (DegreeQualifiedforFIES(dummy)^1)$	-1.30e-05	-1.46e-05	-1.59e-05	-1.66e-05	-1.68e-05	
	(1.02e-05)	(9.65e-06)	(1.08e-05)	(1.08e-05)	(1.06e-05)	
Constant	-0.00692	0.0199***	0.00207	0.00476	0.00140	
	(0.00713)	(0.00752)	(0.0103)	(0.00982)	(0.0109)	
Year Fixed Effects	n	y	y	y	y	
Major Fixed Effects	n	n	y	y	y	
Observations	14,345	14,345	14,345	14,345	14,345	
R-squared	0.084	0.139	0.222	0.251	0.260	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Structural Form Strategy - Logit - Higher Education Demand

VARIABLES	(1) OLS	(2) IV	(3) IV	(4) IV	(5) IV	(6) IV
Tuition (in 2008 Reais)[1]	-0.000240*	-0.00949***	-0.0106***	-0.0134***	-0.0121***	-0.0127***
	(0.000128)	(0.00166)	(0.00181)	(0.00247)	(0.00247)	(0.00329)
(Students with FIES loan)x(Tuition)[1]	-8.10e-05	0.0477	0.0668*	0.126***	0.120***	0.119***
	(0.000513)	(0.0333)	(0.0347)	(0.0411)	(0.0349)	(0.0367)
Students with Fies loan to Enrolled Students Ratio [1]	0.548	-3.850	-13.52	-48.90**	-48.19**	-48.68**
	(0.497)	(22.88)	(23.34)	(24.55)	(19.90)	(21.62)
Enrolled Students (Total)[1]	0.000763***				0.000780***	0.000747***
	(0.000126)				(0.000293)	(0.000265)
Applicant Students to Max Class Size (Ratio)[1]	0.101***				-0.785**	-0.750**
	(0.0251)				(0.323)	(0.327)
Faculty Quality[2] *	0.0611					1.067
	(0.253)					(1.336)
Degrees (Total)[2]	-0.000176					-0.00112
	(0.000673)					(0.00342)
Administrative Staff (Total)[2]	0.000383*					0.000241
	(0.000227)					(0.000400)
Faculty (Total)[2]	7.36e-05**					-6.54e-05
	(3.14e-05)					(0.000225)
$((AvgTuition)^3_{-ht})x(HEIQualifiedforFIES(dummy)^2)$	0.000139					
	(0.000230)					
$((AvgTuition)^3_{-ht}) \times (DegreeQualifiedforFIES(dummy)^1)$	-0.000163					
	(0.000163)					
$(MeanWageFaculty^3) \times (HEIQualifiedforFIES(dummy)^2)$	-4.37e-05					
	(6.97e-05)					
$(MeanWageFaculty^3) \times (DegreeQualifiedforFIES(dummy)^1)$	5.78e-05*					
	(3.47e-05)					
$(MeanWageAdmStaff^3) \times (HEIQualifiedforFIES(dummy)^2)$	-5.00e-05					
	(8.01e-05)					
$(MeanWageAdmStaff^3) \times (DegreeQualifiedforFIES(dummy)^1)$	-1.34e-05					
	(4.95e-05)					
Constant	-7.392***	-2.547***	-2.902***			
	(0.355)	(0.804)	(0.886)			
Year Fixed Effects	y	n	y	y	y	y
Major Fixed Effects	y	n	n	y	y	y
Observations	14,345	14,345	14,345	14,345	14,345	14,345
R-squared	0.240	-2.632	-4.232	-13.832	-10.094	-9.774
Number of CO_CURSO	6,828					

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Market Structure and FIES Penetration at the City Level, 2009 through 2010

Variable	2009	2010	2011	2012
Mean HHI	.2911051	.2983786	.3864118	.4632617
Enrolled Students to Total Higher Education Institutions Mean Ratio	951.5073	1042.346	1018.422	1333.071
Students with Fies loan to Enrolled Students Mean Ratio	.0223118	.0281535	.0401244	.0695199