The Emergence of For-Profit Higher Education Institutions

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Abstract

This paper examines the market conditions that facilitate the entry of for-profit institutions into the higher education market. I show how, despite significant government financial support for public institutions, for-profit institutions may still find it profitable to enter the market. They do so by spending large amounts of money on advertising campaigns in order to attract students who are relatively more influenced by the persuasive effect of advertising. I show that entry is more likely the more government subsidies are targeted directly toward students, as opposed to institutions. Even if it decreases social welfare, the introduction of market conditions that are friendly to for-profit universities will allow a government to fulfill its objective of increasing participation in the higher education system.

Keywords:
For-profit higher education institutions, competition, entry, advertising
JEL: I23, I28, L3.

One prospective student with financial difficulties, the complaint said, was promised in writing that "in five years she would have a job in a hospital, a big house in Florida, enough money to go to Disney World with her family and a new Lexus."

- The New York Times (2010)

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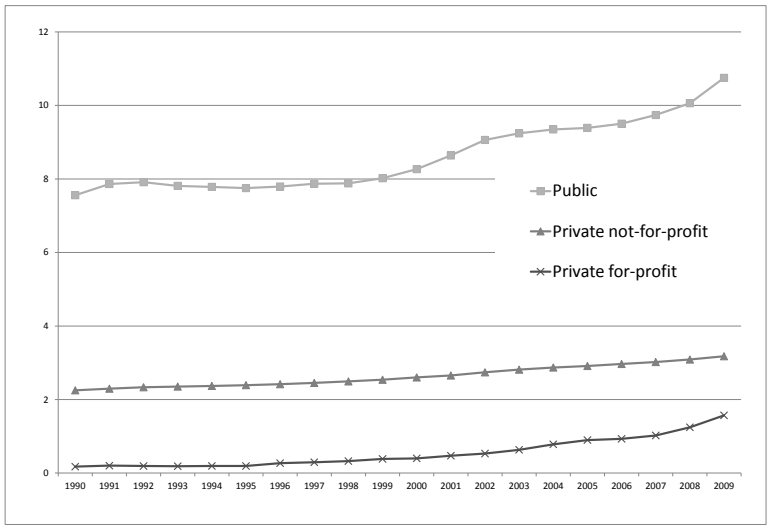
1. Introduction

The last twenty years, public, private not-for-profit and private for-profit HEIs in the United States have all experienced an important increase in their enrollment. Fig. 1 shows the evolution of the number of full time equivalent students enrolled (in millions). We also observe that, up to the end of the nineties, for-profit institutions were playing a minor role in the American higher education landscape. According to the statistics of the U.S. department of Education (U.S. Department of Education (2011)), they now enroll almost two millions of students or more than 10% of the student population.

For-profit HEI's are not uncontroversial. Several puzzling facts have sur-

Figure 1: Number of full-time equivalent students enrolled by type of institution (in millions)



Source: U.S. Department of Education (2011).

rounded the large expansion of the for-profit sector.

First of all, Chung (2009), Deming et al. (2012), Cellini and Chaudhary (2012) and Lang and Weinstein (2014) have observed that the quality (as measured by the impact of education on employability, earnings or wages) of the degrees offered by for-profit institution is lower, and at best equal, compared with the ones offered at traditional higher education instituions (HEIs hereafter).

Secondly, According to the U.S. Government Accountability Office (2010), their for-profit higher education programs are between six to thirteen times more expensive than the ones offered in comparable traditional institutions (community- or four-year colleges).

Thirdly, while only 10% of the students are going to a for-profit college, they form 26% of the population of borrowers and 43% of the population of defaulters (U.S. Department of Education (2011)). Further, Cellini (2012) computed that a student will have a positive net return from going to a for-profit HEI if and only if his additional earnings per year of education exceeds 8.5% while Cellini and Chaudhary (2012) estimated average earning gains between 6% and 8%. Considering that for-profit institutions are offering programs in fields with high job prospects (Kinser (2007)), this raises for a majority of students the question of the worthiness of this human capital investment.

These observations are even more puzzling knowing that students see the programs offered by for-profit and by traditional (public and not-for-profit) institutions as closed substitutes (Cellini (2009)). According to Chung (2012), this is particularly true for students with relatively lower cognitive and non-cognitive skills. Hence, both types of institutions have an overlapping student base and are active in the same market.

At first sight, if students were balancing the costs and benefits of education[2], they would quite likely have earned a higher net return by going to a traditional HEI and, even, by not studying further at all. The objective of this paper is to see how it is possible to reconcile these observations surrounding the emergence of for-profit HEIs and the theory of human capital.

Our main argument is that, in order to attract students, for-profit institutions invest intensively in advertising campaigns. This strategy aims at attracting students by increasing their perceived benefits of studying in a for-profit institution.

Table 1 compares the advertising intensities (total advertising expenditures divided by revenues) of the ten most famous for-profit HEIs, of a traditional (private not-for-profit/public) HEI and the average of the U.S.'s top ten marketers. This ratio is twenty times higher for for-profit institutions compared with a traditional one. The marketing intensity of the for-profit institutions is on average more than twice higher than for the average American top ten marketer. None of these firms even reaches the ratio of the least advertising intensive for-profit institution in our sample[3]. These differences are even bigger if we also consider expenses related with the recruitment and the admission of students. Based on the financial data of the thirty biggest for-profit companies, U.S. Senate Committee on Health, Education, Labor and Pensions (2012) observed that a total of $22,7\%$ of their revenues are spent in these two categories.

[2] In this paper, we abstract from the externalities created by higher education. Few is known about the non-monetary effects created by for-profit higher education. Persell and Wenglinsky (2004) is an exception. They observed that compared with traditional education, for-profit education has a negative impact on the civic behavior of students (they are less likely to vote, to participate in political activities and to become involved in their communities (through, for example, voluntary work)). This empirical result can be added to the list of puzzling facts surrounding for-profit higher education.

[3] According to www.wordstream.com, the University of Phoenix, which is the largest for-profit HEI, was Google's biggest advertiser in 2012 and spent close to $170,000 a day on Adwords.

Not only the size of their investment in advertising has pulled the attention. Testings by the U.S. Government Accountability Office (2010) have shown that for-profit institutions have repeatedly engaged in questionable marketing practices. In their recruitment campaigns, several for-profit colleges were accused of exaggerating after graduation salary, of giving false information about the college's accreditation, of misrepresenting graduation rates or future employment perspectives. Similar conclusions have been drawn by the U.S. Senate Committee on Health, Education, Labor and Pensions (2012). Several litigations concerning deceptive recruitment practices are still pending[4].

Table 1: Advertising intensities of HEIs and of the average top ten marketer in the U.S.

Marketer	Advertising Intensity
American Public education	11.1%
Apollo Group	12.7%
Bridgepoint Education	11%
Capella Education	15.1%
Career Education, Inc.	14.3%
Corinthian Colleges Inc.	9.2%
DeVry Inc.	11.7%
Education Management	10.4%
Strayer Education Inc.	11%
Universal Technical Institute	7.5%
Traditional American HEI	maximum 0.5%
Average top 10 marketer	4.7%

Source: Steinerman et al. (2011), LipmanHearne (2010) and Belleflamme and Peitz (2010).

This paper develops a theoretical framework of how for-profit institutions were able to enter the higher education market by investing into advertising and influence the student's perceived benefits that can be derived from their educational programs. Through their advertising campaigns, they are able (1) to segment a share of the student's market that then would consider their existence when deciding to pursue their studies and (2) to persuade them of the supposedly high benefits that can be derived from following their programs (Königbauer (2007)). Due to a more important naivety bias, students who are normally relatively less inclined to go to a traditional institution will be relatively more impacted by the persuasive effect of advertising. In other words, advertising will explain the overestimation of the benefits from studying in a for-profit HEI[5].

[4]See the discussions in articles of the The Economist (2010) and of The New York Times (2010)

[5]A closely related argument has been developed in intertemporal behavioral models (DellaVigna and Malmendier (2004)) to explain puzzling quality/price market outcomes for goods and services with delayed benefits. Observed consumer decision making can be predicted by assuming that they are naive as defined by the overconfidence about the time inconsistency of the consumer's preferences. Note that compared to this approach, the student's decision

We formalize this idea by building a mixed-duopoly model between HEIs (as in Del Rey (2009)) where the incumbent has multiple objectives. On one side it cares about the prestige derived from the educational programs it offers and on the other side it values the research produced in the institution. The threat of entry by a for-profit firm, which uses educational programs to attain its financial objectives, is endogenized.
Our main findings are the following. The model supports the fact that for-profit HEIs tend to fix a higher tuition fee the more students are subsidized to study there. This is in line with the Bennett Hypothesis according to which institutions are reacting to an increase in the subsidized loans or grants programs available to students by setting higher fees. Second, we show how a change towards a demand-side funding of education (where students are subsidized to study), rather than a supply-side funding system (where HEIs are subsidized), is facilitating the entry of for-profit HEIs when students have access to this loan/grant system to go study there. This model brings attention to one of the caveats of the use of demand-side subsidies as suggested by the Tiebout hypothesis: the consequence related with the inability of students to assess correctly the benefits of education. Third, we derive the conditions under which for-profit HEIs will prefer not to improve the quality of the education it provides. Fourth, we highlight how the decreasing importance given by traditional HEIs to education (at the gain of research for example) has facilitated the emergence of for-profit HEIs. Finally, despite the decrease in social welfare that it creates, we highlight why governmental authorities might still find it profitable to ease the entry of for-profit institutions. We argue that it allows them to better reach their objective of widening the participation of students to the higher education system.
The paper is organized as follows. Section 2 surveys the explanations of the emergence of for-profit HEIs developed in the economics and in the higher education policy literature. The policy context is exposed in Section 3. The model is developed in Section 4. In Section 5, the equilibrium outcome is described as well as a welfare analysis. Section 6 discusses the robustness of our results as well as its policy implications. Section 7 concludes.

2. Literature Review

Several explanations of the emergence of for-profit institutions have already been discussed in the economic and higher education literature (see Breneman et al. (2006) for a detailled coverage on this issue).
On the supply side, Ortmann (2001) and Kinser (2007) argue that the business model of for-profit institutions makes them more cost effective. Many for-profit institutions have shifted from being enterprise colleges owned and managed

making process is simplified and static. We rather focus on the role played by this naivety bias (as in Gabaix and Laibson (2006)) on the strategic interactions between institutions.

by the same judicial person (individual, family or corporation) towards multi-campus/publicly traded corporations. This has allowed them to take advantage of regulatory/marketing economies of scale and to have quickly access to funds in order to be responsive to the market demand. For Winston (1999), the objective of traditional (public or not-for-profit) HEIs makes them less cost effective. This is due to the positional nature of competition which makes them waste resources in order to achieve a higher rank in the hierarchy of HEIs, by investing in research rather than in their educational programs. According to Turner (2006), for-profit providers were able to enter the market thanks to the inelastic supply of traditional institution.[6]

On the demand side, the reduction in the gap between the price to be paid to go to a traditional and to go to a for-profit institution has been reduced (Cellini (2010)). On the one hand, the last ten years, traditional institutions have raised their tuition fees. On the other hand, there has been an increase in the funding going to Federal Pell Grant and GI Bill which students going to for-profit colleges are entitled to use. Coupled with the increasing demand for education, this change could explain the recent emergence of for-profit institutions. A second possbile explanation has been developed by Brunello and Rocco (2008) in the context of compulsory education. Their basic idea is that private institutions offer programs of a lower standard which means that students can graduate for a lower cost of effort. They show that this outcome can survive a majority voting system if the costs of a higher standard for the private school are low compare to its benefits. Low standards were alleged by a report of the U.S. Government Accountability Office (2011)). In the context of higher education, note that this concept of effort cost could even be extended to the one of opportunity cost as for-profit institutions tend to be located in easily accessible places (highway exits, shopping malls, business districts, etc.) and offer very flexible programs (not only semester programs, evening/week-end classes, accelerated degrees, etc.).

However, these explanations cannot altogether reconcile the co-existence of our puzzling facts without violating the theory of human capital. At best, Turner (2006)'s and Brunello and Rocco (2008)'s argumentations could be used to explain why students decide to invest in for-profit instead of traditional higher education, even if the latter is cheaper and of a higher quality. However, this could not be used to explain why they decided to make this human capital investment. The aim of this paper is to offer a model that could encompass this possibility.

[6] As the number of community colleges (often seen by the student population as the closest option outside of for-profit HEIs) was stable throughout the last 20 years, individual institutions have increased the size of their enrollment by more than 40%. The elasticity of substitution of community colleges computed by (Bound and Turner (2007)) is of 0.88. Hence, capacity constraints were not important at the agregate level. However, as discussed in Turner (2006) and Cellini (2009), rationing might have been an issue in some areas.

3. Policy Context

On June 2, 2011, the Obama administration released the "gainful employment regulations" which change the conditions to qualify for federal aid (for-profit institutions are eligible for these "Title IV" funds since 1972 and the change of the Higher Education Amendments of 1965). These regulations were introduced after the growing discontent around for-profit colleges. Several criteria will have to be respected by the institutions hosting students receiving federal aid: (1) loan repayment by at least 35% of the students formerly enrolled in, (2) an annual loan payment which is less than 30% of her or his discretionary income or an annual loan payment that does not exceed 12% of the total earnings. However, due to a federal court rule blocking one of these criteria, these regulations are not yet implemented and new rules are still being negotiated (The Chronicle of Higher Education (2013)).

In the United Kingdom, the financing mode of universities changed starting from the academic year 2012/2013. Direct teaching grants given to universities have since then decreased and they are instead financed by the higher tuition fee paid by students. From there on, universities were able to fix their tuition fee up to £9,000 (as opposed to £3,375 before). Next to this, a subsidized income contingent loan system was introduced. Only the accredited universities are entitled to enroll subsidized students. Since 2010, BPP University College and the Greenwich School of Management are the only for-profit HEI with an accreditation. A white paper (which discusses new policy directions on a particular topic and nourishes the democratic debates) has recently been published. It discusses the possibility to further open the doors to private for-profit HEIs in order to "promote the development of a more diverse, dynamic and responsive higher education sector where funding follows the student and the forces of competition replace the burdens of bureaucracy in driving up the quality of the academic experience" (U.K. Department for Business Innovation and Skills (2011), p.24). In other words, they believe that the competition created by for-profit providers can lead to a better functioning of traditional HEI's by creating a disciplining effect. A new regulatory framework was expected for the academic year 2012/2013. Howevern according to some media (The Telegraph (2012)), these plans have been postponed.

The presence of for-profit HEIs is quite marginal in the rest of Europe (except for some advanced specialized programs and in some Eastern European countries). Although, there is a push by policymakers to promote a different funding system for European universities (Aghion et al. (2010) and Van Der Ploeg and Veugelers (2008)). They argue for a bigger private investment in higher education, especially through an increase in tuition fees. However, students would also have access to funding sources to finance their education expenditures in the form of competitive grants and through a loan system. Depending on the system that would accreditate universities, this might open the doors of the higher education sector to new institutions including for-profit ones.

For-profit HEIs are quite active in Chile and in some Asian countries (Kinser and Levy (2006)). Although, it is difficult to find accurate information about

these countries. Their legislations are quite different and relatively difficult to grasp. The ownership structure of for-profit institutions are also very different (less likely to be multi-campus publicly traded institutions) and the information about them is quite diffuse.

4. The Model

In this section, we first derive the case where the traditional HEI acts as a monopoly. Then, we derive the case where entry of a for-profit HEI can occur and the three possible kinds of behavior of the traditional HEI: blockaded entry (where it acts as a monopoly and no entry is observed), deterred entry (where the traditional HEI strategically drives the for-profit HEI out of the market) and accommodated entry (where entry takes place).

4.1. Monopoly Case

Students decide whether or not they want to study in a traditional HEI based on a very simple static cost-benefit analysis. On the one hand, they benefit from studying because it increases their productivity. This can be interpreted as the discounted present value of further studying. On the other hand, they have to pay a fee which can be partially subsidized in order to enroll higher education. This can be done in the form of a grant, a voucher system, a student allowance or a loan system (only the subsidized part).
We assume that the productivity premium depends on q_u, the quality of the education provided, and on the student's ability θ_s which is uniformly distributed between 0 and 1. The tuition fee to be paid to the HEI is represented by f_u. Students only pay a share z_u of this tuition fee. The government subsidizes the $1 - z_u$ share left. A student will decide to go study if his net utility is weakly positive. The net utility of going to the traditional HEI is such that:

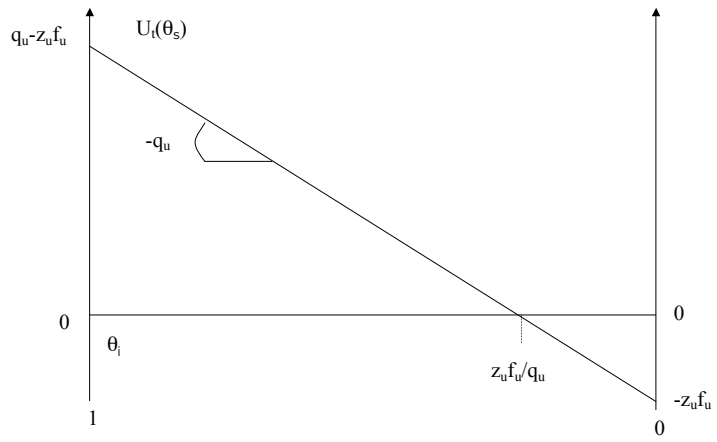
$$U_t(\theta_s) = \theta_s q_u - z_u f_u$$

The students' net utility derived from their education decision are shown in Fig. 2. Note that the student's participation decision is endogeneous and that the market is not fully covered, as this is one of the peculiarity of higher education compared with compulsory education.

The traditional (not-for-profit/public) HEI maximizes its utility U_u subject to a budget constraint. Utility is composed of two elements: one related with its educational activities and the other one which is related with its research activities[7]. When valuing education, we assume that the traditional HEI cares

[7]This second objective captures the fact that teaching activities have an opportunity cost. Interpreting it as research activities seems quite natural if we think of a research university. For other type of institutions, this can also be interpreted as the other missions (like local economic development for community college or the spread of beliefs for religious institutions) followed by the institution. This can also be interpreted as the extent of rent seeking expenditures arising in the institution (although we will assume that the social welfare will positively increase in R in our welfare analysis).

Figure 2: Student's utility derived from studying in a traditional HEI



about the total productivity increase it creates. For simplicity, research activities are valued by the revenues invested to finance this activity. The relative importance that the HEI gives to its education output compared to its research output is described by γ. The objective of the traditional HEI can be rewritten as:

$$\gamma \int_{\overline{\theta_s}}^{1} \theta_s q_u \, \mathrm{d}\theta_s + R \tag{1}$$

The traditional HEI's budget is as follows. Revenues are solely on a per-student base. The institution receives f_u from the students and, in addition, the government gives a direct per-student subsidy s_u. There are two types of expenditures: the ones related with the amount of money invested into research as represented by R and a per-student cost of providing education c_u. We assume that the unit cost of education is linearly increasing in its quality such that: $c_u = \delta q_u$. The budget constraint of the traditional HEI is as follows:

$$N_u f_u + N_u s_u = R + N_u c_u \tag{2}$$

We suppose that the only tool at the disposal of the HEI in order to balance its expenditures between research and education is to choose the quality of its education q_u. In this monopoly case, the timing of the game is the following:

Stage 1: The HEI chooses the quality of its educational programs.

Stage 2: Students decide whether or not to go study.

With this specification, we have in stage 2 that the indifferent student is represented by $\overline{\theta} = \frac{z_u f_u}{q_u}$ and the student's enrollment is $N_u = 1 - \overline{\theta}$.
In stage 1 of the model, we can rewrite the budget constraint in Eq. 2 explicitly with respect to R and replace it in the objective function in Eq. 1. After simplification, we have that:

$$\gamma \int_{\overline{\theta_s}}^{1} \theta_s q_u \, \mathrm{d}\theta_s + (1-\overline{\theta})(f_u + s_u - \delta q_u) = \gamma \frac{q_u}{2}\left(1 - (\frac{z_u f_u}{q_u})^2\right) + (1 - \frac{z_u f_u}{q_u})(f_u + s_u - \delta q_u) \quad (3)$$

The first order condition from maximizing Eq. 3 with respect to q_u is:

$$\frac{\gamma}{2}\big(1 - (\frac{z_u f_u}{q_u^*})^2\big) + \gamma(\frac{z_u q_u^*}{q_u^*})^2 - \delta(1 - \frac{z_u f_u}{q_u^*}) + (s_u - \delta q_u^* + f_u)\frac{z_u f_u}{(q_u^*)^2} = 0 \quad (4)$$

From a marginal change in q_u, we can disentangle several effects. The first two are positive and are related with the change it creates on the total student productivity derived from higher education. The first effect is due to the increased productivity created by the improved quality of education and the second comes from the additional student which is enrolled at the margin. The last two effects are related with the research activities. The first of these two effects is the direct decrease in funding diverted to education instead of research and is always negative. The second can be either positive or negative and is due to the higher number of students enrolled which is an additional source of income but also of expenditure. From Eq. 4, we find that at the optimum, the monopoly HEI will set the quality of its education at:

$$q_u^* = \sqrt{\frac{\gamma(z_u f_u)^2 + 2 z_u f_u s_u + 2 z_u f_u^2}{2\delta - \gamma}}$$

We assume that $2\delta - \gamma > 0$ is respected, otherwise the two first positive effects will be too important and an infinitely high quality level will be chosen. Therefore, we have that the quality of education chosen increases in f_u, in γ, in s_u and decreases in δ. An increase in z_u will also lead to an increase in the quality of the programs offered. This is needed to compensate for the rise in tuition to be paid in order to keep attracting students.

4.2. Entry Case

We now consider the case where entry can take place. This decision will depend on the impact of the different parameters of the model on the anticipated profit of the for-profit HEI. It depends on the direct impact of a parameter on the anticipated profit and on the indirect impact related with the quality of education chosen by the traditional HEI. This quality level will be chosen in order to block, deter or accommodate entry. The for-profit institution will try to enter the market of higher education thanks to intensive advertising campaigns. In this entry case, the strategic game takes place as follows:

Stage 1: The traditional HEI chooses the quality of its programs.

Stage 2: The for-profit institution decides to enter the market of higher education or not.

Stage 3: If it enters, the for-profit institution sets its level of advertising and its tuition fee.

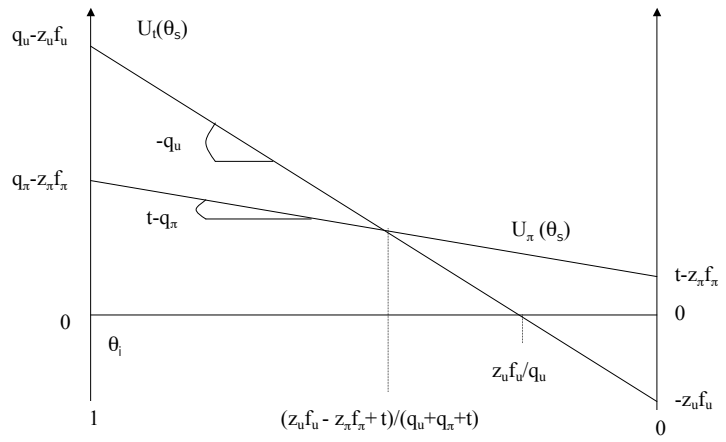
Stage 4: Students decide whether and where to go study.

The advertising technology is modeled in a way similar to Königbauer (2007). It plays the dual role of segmenting the market by making a share of the student's population consider their existence when making their education decision and of persuading those students to go there by distorting upwards the perceived benefits that can be derived from the education provided.
Formally, we have that a fraction ϕ of the students considers the existence of the for-profit HEI when making their educational choice. This is the exposed part of the student population. The $1-\phi$ students left are unexposed and can only decide whether or not to go study at a traditional HEI. The cost of advertising is such that: $\Phi(\phi) = \frac{\phi^2}{2}$. The fraction of exposed students is randomly chosen from the student's population, i.e. it is independent from the student's types.
The perceived benefits of education for the exposed students depend both on the quality of education provided and on the distortion created by advertising. These two parts cannot be disentangled by the students but are known by both HEIs. As in a traditional HEI, we assume that more able students benefit more from the quality of education provided at a for-profit HEI, as represented by q_π. The upward bias created by the persuasive effect of advertising positively depends on t, the maximum level of opacity concerning the benefits of further studying. In the context of higher education, this opacity arises from the impossibility to certify ex-ante that the perceived benefits received from an educational program will be effective. We assume that this persuasive effect is smaller for relatively more able students. This hypothesis is supported by the cognitive learning literature which analyze how people respond differently to persuasive communication (see a.o. Greenwald (1968)). In the higher education context, it also seems to be supported by Chung (2012) who observes that students with relatively less cognitive and non-cognitive skills are the ones with the more misconceptions about the perceived benefits from higher education. The specification of the distortion created by the persuasive effect of advertising will be $(1-\theta_s)t$. For simplicity, we suppose that these two effects enter the student's utility function in an additively separable manner. This way, we will have that relatively less able students will be the most tempted to study in a for-profit HEI.
The costs for students to follow a program at a for-profit HEI is similar than for a traditional HEI as it has to pay a fee f_π and only a share z_π must be paid by the students, the rest being subsidized by public funds. The students' net utility of going to a for-profit HEI are such that:

$$U_\pi(\theta_s) = \theta_s q_\pi + (1-\theta_s)t - z_\pi f_\pi$$

Both the students' net utility of going to a for-profit or a traditional HEI are pictured in Fig. 3. Remark that an increase in t will change the slope of the student's utility derived from going to a for-profit institution. The for-profit HEI

Figure 3: Student's utility derived from studying in a traditional or a for-profit HEI



does not get any direct funding from the government, although their students can be subsidized to study there at a co-payment rate z_π. In addition to a per-student unit cost of education linearly increasing in the quality of education $c_\pi = \chi q_\pi$, it must pay a fixed entry cost F and the cost of advertising. N_π^e is the share of exposed students who decide to enroll the for-profit HEI. When entry occurs, the maximization problem of the for-profit HEI is such that:

$$\max_{\phi, f_\pi} \quad \phi N_\pi^e (f_\pi - c_\pi) - \frac{\phi^2}{2} - F \tag{5}$$

We solve the game backwards starting from the student's decision to participate.

We will make further restrictions on the parameters analyzed. In line with the American higher education landscape discussed in the introduction, we assume that the quality of education is higher in the traditional system ($q_u > q_\pi$) and that the education provided there is less costly ($f_\pi > f_u$). In our framework, q_π is exogenous. This can be interpreted as the minimum level required to be entitled to host students receiving government subsidies[8]. We also assume that

[8] Although, we will be able to show, in Section 6, the condition needed such that an increase in q_π has a negative impact on the entrant's profit, i.e. the condition such that the for-profit institution has no incentive to improve the quality of its education if it had the opportunity to.

$t = 0$ for traditional institution in the exposed market and that they will not try to persuade students via advertising campaigns.
This is in line with what we observe and the conclusions drawn by the incomplete contract theory literature. The ownership structure of traditional HEI, more precisely their non-distribution constraint, plays a commitment role. First, as argued in Hansmann (1980) and in Glaeser and Shleifer (2001), it commits them to invest in the non-contractable quality of what they offer in the market. Second, as argued in Bubb and Kaufman (2013), it commits them not to exploit the existence of consumer biases as here via persuasive advertising.

Stage 4

We have two student's markets depending on whether or not they are exposed to the presence of for-profit higher education. The probability to end up in one of the two markets depends on the level of advertising ϕ which will be chosen in stage 3 of the game.
For the $1-\phi$ segment of *unexposed students (u)*, the choice is between the traditional institution and not studying. Their enrollment function is such that:

$$N_u^u = 1 - \overline{\theta_s} = 1 - \frac{z_u f_u}{q_u}$$

In this segment of the market, the traditional HEI behaves as a monopoly.
For the ϕ segment of the *exposed students (e)*, the choice is between the traditional and the for-profit HEI. The student of ability $\tilde{\theta_s}$ is indifferent between the two types of institutions such that $U_\pi(\tilde{\theta_s}) = U_t(\tilde{\theta_s})$. It can be explicitly defined by $\tilde{\theta_s} = \frac{z_u f_u - z_\pi f_\pi + t}{q_u - (q_\pi - t)}$.
For tractability, we assume that the market for exposed students is fully covered. Two conditions, which can be better understood from Fig. 3, need to be respected for this. The first condition ($t \geq z_\pi f_\pi$) guarantees that the least able student, the one of type $\theta_s = 0$, always decides to go study to a for-profit institution. The second condition ($t \geq \frac{z_\pi f_\pi q_u - z_u f_u q_\pi}{q_u - z_u f_u}$) implies that the indifferent student derives a positive net utility from studying ($U_t(\overline{\theta_s}) = U_\pi(\overline{\theta_s}) \geq 0$). Hence, we will assume throughout the paper that t is sufficiently large, i.e. $t \geq \max\left(z_\pi f_\pi, \frac{z_\pi f_\pi q_u - z_u f_u q_\pi}{q_u - z_u f_u}\right)$.
For exposed students, the enrollments to the traditional and to the for-profit institution are respectively:

$$N_u^e = 1 - \tilde{\theta_s} = 1 - \frac{z_u f_u - z_\pi f_\pi + t}{q_u - (q_\pi - t)} \quad \text{and} \quad N_\pi^e = \tilde{\theta_s} = \frac{z_u f_u - z_\pi f_\pi + t}{q_u - (q_\pi - t)} \tag{6}$$

Stage 3

Assuming that the for-profit HEI has entered the market in stage 2, we look at the strategic decision made by the for-profit HEI. It chooses simultaneously the amount to invest into advertising ϕ and the tuition fee f_π, i.e. the for-profit

institution maximizes Eq. (5) considering Eq. (6). The first order conditions with respect to respectively f_π and ϕ are:

$$\phi^* \tilde{\theta}_s - \phi^* z_\pi \frac{f_\pi^* - c_\pi}{q_u - (q_\pi + t)} = 0$$

$$\tilde{\theta}_s (f_\pi^* - c_\pi) - \phi^* = 0$$

Relying on the first expression, two counteracting effects are created by an incremental increase in f_π: it increases the revenues received by the for-profit institution and it decreases the demand of students to go study there. The second first order condition shows that increasing the amount of advertising done will increase the revenues due to a higher demand but will increase the cost related to advertising. At the optimum[9], the solution of this system of equation is unique and is such that:

$$f_\pi^* = \frac{z_u f_u + z_\pi \chi q_\pi + t}{2 z_\pi} \quad \text{and} \quad \phi^* = \frac{(z_u f_u - \chi q_\pi z_\pi + t)^2}{4 z_\pi (q_u - (q_\pi - t))}$$

Observe that f_π^* is decreasing in z_π, the share of the tuition fee which is paid by the student. Therefore, under our specification, the Bennett Hypothesis, according to which federal grants and student loans are leading to a tuition increase, is observed. This seems in lign with Cellini and Goldin (2014) who have empirically found that for-profit institutions have captured the increase in tuition subsidies given to their students. The fee chosen by the for-profit HEI is also increasing in the education cost parameter χ, in the quality of education q_π, in the level of opacity t and in the net tuition fee paid by students going to the traditional HEI $z_u f_u$.
We have that the quantity of advertising is always decreasing with respect to z_π and q_u and increasing in t. It is also increasing[10] in z_u and f_u but decreasing in χ. Depending on the parameters of the model, ϕ^* can increase or decrease in q_π.

Stage 2

The condition that must be respected to observe the entry of the for-profit institution is that it can anticipate a positive profit. It will depend on the quality level of education chosen by the traditional institution in the first stage of the game. Entering the market will be profitable when:

$$\pi(q_u) = \phi^* \Big(\frac{z_u f_u - z_\pi f_\pi^* + t}{q_u - (q_\pi - t)} \Big) (f_\pi^* - \chi q_\pi) - \frac{(\phi^*)^2}{2} - F \geq 0$$

[9]The second order condition to be a maximum is such that: $2\phi z_\pi (q_u - (q_\pi - t)) - (z_u f_u + z_\pi (\chi q_\pi - 2 f_\pi) + t)^2 > 0$. It will be checked ex-post.

[10]To show this, note that $z_u f_u - \chi q_\pi z_\pi + t > 0$ as $c_\pi = \chi q_\pi$, $t \geq z_\pi f_\pi$ to have a fully covered market of exposed students and that $f_\pi > c_\pi$ otherwise it will not be able to make a positive profit.

After replacing ϕ^* and f_π^* by their respective subgame perfect equilibrium value, we find that market entry will take place according to the following condition:

$$\pi(q_u) = \frac{(z_u f_u + t - z_\pi \chi q_\pi)^4}{32 z_\pi^2 (q_u - (q_\pi - t))^2} - F \geq 0 \tag{7}$$

The profit function is quadratic with respect to q_u and we have that, for $q_u \geq 0$, $\frac{d\pi^*(q_u)}{dq_u} < 0$. The higher the quality level chosen by the traditional institution the lower will be the profit of the for-profit institution. Hence, it is always possible to avoid the entry of the for-profit HEI but it is not always optimal to do so as setting a higher q_u is costly.
The quality level chosen will be determined in the initial stage of the game. The threshold quality level after which no entry will take place is defined by q_u^D such that:

$$\frac{(z_u f_u + t - z_\pi \chi q_\pi)^4}{32 z_\pi^2 (q_u^D - (q_\pi - t))^2} - F = 0 \tag{8}$$

This condition can be rewritten explicitly such as:

$$q_u^D = q_\pi - t + \frac{(z_u f_u - z_\pi \chi q_\pi + t)^2}{4 z_\pi \sqrt{2F}} \tag{9}$$

We see that q_u^D is the positive root of Eq. (8). It is increasing in $z_u f_u$ the money paid by students to go study. It is also decreasing in F, in χ and in z_π. It will also be increasing in t if $t > 2\sqrt{2F} + z_\pi \chi q_\pi - z_u f_u$. q_u^D will be decreasing in q_π for $q_\pi > \frac{\chi(f_u + t) - 2\sqrt{2F}}{\chi^2 z_\pi}$.

Stage 1

In this first stage, the incumbent sets the quality of its education q_u. Following Bain (1956)'s terminology, three kinds of behavior are possible: blockaded entry, deterred entry and accommodated entry.

- Blockaded Entry
  Here, it is such that without anticipating the potential threat of entry, the traditional insitution will set q_u^B as to maximize her utility. Hence, this assumes the same maximization problem as in the monopoly case. In this case the optimal quality level will be set at:

$$q_u^B = \sqrt{\frac{\gamma(z_u f_u)^2 + 2 z_u f_u s_u + 2 z_u f_u^2}{2\delta - \gamma}}$$

- Deterred Entry
  In this case, the incumbent decides to choose the minimum quality level that will allow him to avoid the entry of the for-profit institution in the market of higher education. As computed in the previous stage of the game, it is such that:

$$q_u^D = q_\pi - t + \frac{(z_u f_u - z_\pi \chi q_\pi + t)^2}{4 z_\pi \sqrt{2F}}$$

- Accommodated Entry
  In this case, the traditional institution also anticipates the potential entry of the for-profit HEI but does not try to avoid its entry. It will therefore choose q_u^A such that:

$$\max_{q_u} \quad \gamma\big[\phi \int_{\tilde{\theta_s}}^{1} \theta_s q_u \, \mathrm{d}\theta_s + (1-\phi) \int_{\overline{\theta_s}}^{1} \theta_s q_u \, \mathrm{d}\theta_s\big] + N_u(f_u + s_u - c_u) \quad (10)$$

  s.t.

$$N_u = \phi(1-\tilde{\theta_s}) + (1-\phi)(1-\overline{\theta_s}) \quad ; \quad \tilde{\theta_s} = \frac{z_u f_u - z_\pi f_\pi + t}{q_u - (q_\pi - t)} \quad ; \quad \overline{\theta_s} = \frac{z_u f_u}{q_u}$$

$$\phi^* = \frac{(z_u f_u + (t - z_\pi \chi q_\pi))^2}{4 z_\pi (q_u - (q_\pi - t))} \quad ; \quad f_\pi^* = \frac{z_u f_u + t + z_\pi \chi q_\pi}{2 z_\pi} \quad ; \quad c_u = \delta q_u$$

The optimal quality $q_u A$ chosen[11] under accommodated entry is defined by the following first order condition:

$$\frac{\gamma}{2}\Big[\big((1-\phi^*)(1 - \frac{z_u^2 f_u^2}{(q_u^A)^2}) + (\phi^*)(1 - \frac{(z_u f_u + (t - z_\pi \chi q_\pi))^2}{4(q_u^A - (q_\pi - t))^2})\big) \quad (11)$$

$$+ q_u^A \left((1-\phi^*) \frac{2 z_u^2 f_u^2}{(q_u^A)^3} + \phi^* \frac{(z_u f_u + t - z_\pi \chi q_\pi)^2}{2(q_u^A - (q_\pi - t))^3} + \phi' \big((1 - \frac{(z_u f_u + t - z_\pi \chi q_\pi)^2}{4(q_u^A - (q_\pi - t))^2}) - (1 - \frac{z_u^2 f_u^2}{(q_u^A)^2}) \big) \right) \Big] \quad (12)$$

$$-\delta \Big[\phi^* (1 - \tilde{\theta_s}) + (1 - \phi^*)(1 - \overline{\theta_s}) \Big] \quad (13)$$

$$+ (f_u + s_u - c_u) \left((1-\phi^*) \frac{z_u f_u}{(q_u^A)^2} + \phi^* \frac{(z_u f_u + t - z_\pi \chi q_\pi)}{(q_u^A - (q_\pi - t))^2} - \phi' (\tilde{\theta_s} - \overline{\theta_s}) \right) = 0 \quad (14)$$

As for the monopoly case, the marginal effect of an increase in q_u^A can be disentangle in several effects. The first two effects are affecting how the institution values its production of education. Eq. (11) shows the effect created by the increased quality on the productivity of all the students who decides to study there. Eq. (12) shows the marginal impact created by the additional student who decides to go there. The other two effects are concerned with the impact that an increase in quality has on the research produced. Eq. (13) shows the decrease in research money due to the increase in providing an education of quality and Eq. (14) shows the additional funds allocated to research related to the additional net income coming from having more students attracted by the

[11] A non-negative weighted average of two concave functions is still concave. The term following $(1-\phi)$ is always concave. Therefore, a sufficient condition for the term following ϕ to be concave is that $q_\pi > t$, i.e. that the exposed student's utility of going to a for-profit institution decreases with respect to his ability. Necessary conditions will be derived ex-post in the numerical example.

improved quality of education. The first and second effects are always positive. The third effect is always negative. The last effect can either be positive or negative. It is positive when some of the surplus earned from the per-student funding cross-subsidizes research activities. It is negative when $R < 0$. This is possible because in our very simple framework we assumed that the only funding source is the amount of subsidy received per student enrolled in.
Depending on the parameters of the model, the traditional HEI will choose the quality level (q_u^A, q_u^B or q_u^D). If $q_u^B > q_u^D$, then entry will be blockaded. Otherwise, entry will be accommodated if $U_u(q_u^A) > U_u(q_u^D)$ and deterred when $U_u(q_u^A) \leq U_u(q_u^D)$.

5. Analysis

The overall impact of an incremental parameter change depends on the two effects it creates. The first is the direct impact on the entrant's anticipated profit (see Eq. (7)). The second is the indirect impact on the quality q_u that would be chosen in the case where entry is accommodated. This effect is related with the disciplining effect created on the traditional HEI by the potential entry of a for-profit HEI. Due to the impossibility to solve explicitly q_u^A and the fact that the two effects are often going in an opposite direction[12], it is difficult to compute analytically which of the three behaviors will prevail. Therefore, a numerical analysis will give, at least suggestive, evidence about the impact of potential policy interventions.
The calibration of the model is inspired by the U.S. policy context. According to Institute for College Access and Success (2009), the student's tuition paid to go to a traditional HEI is subsidized at a rate of 40% while, according to the U.S. Department of Education (2011), students going to a for-profit institution are subsidized at a rate of 75%. Therefore, z_u and z_π are respectively equal to 0.25 and 0.6. The other parameters are calibrated such that the following targets are attained. According to the U.S. Department of Education (2011), the tuition of traditional HEI f_u is on average six to seven times lower than the one at a for-profit institution f_π for similar programs content-wise. According to LipmanHearne (2010) and computations based on the financial reports of for-profit institutions, $\frac{\Phi}{\phi N_\pi \chi q_\pi + \Phi + F}$, the share of spending invested in advertising and promotional activities is between 20% and 30%. The share of students going to a for-profit HEI $\frac{N_\pi}{N_\pi + N_u}$ within the population participating to a further education program is equal to 11%. As discussed previously, we also have that $q_u > q_\pi$. The equilibrium conditions derived analytically are checked ex-post.
Parameters' change are analyzed into three separate groups: the ones related with the traditional institution (γ, f_u and δ), the ones related with the for-profit HEI (t, q_π and χ) and the ones related with the public financing of higher education (z_u, z_π and s_u). We have, in stage 3, already shown that F has

[12] Based on Eq. (7), we observe that a change in F has only a direct impact on entry. For smaller fixed entry costs, entry will be more likely.

a negative impact on the probability of entry of the for-profit HEI. The base scenario assumes the following parameter values: $\gamma = 1.6$, $z_u = 0.6$, $f_u = 1.3$, $z_\pi = 0.25$, $s_u = 3.9$ $\delta = 0.9$, $t = 2.4$, $q_\pi = 4.2$, $\chi = 0.905$ and $F = 0.2$. B stands for blockaded entry and D for deterred entry. The last two columns will be discussed in the next subsection. We look at discrete parameters' changes and describe how these changes impact the strategic choices made, the level of profit as well as the student's demand to go study in one of the two types of HEI. We first focus on the decision to enter the market. Then, we analyze the welfare consequences that this might have.

5.1. Numerical Analysis

Traditional HEI's parameters

Table 2: Numerical analysis: Traditional HEI's parameters

Parameters	ϕ^*	f^*_π	$q^B_u > q^D_u$	q^*_u	U^*_A	U^*_B	U^*_D	π	N_π	N_u	W^1	W^2
$\gamma = 1.4$	0.95	8.26	No	7.1	**3.8**	4	3.5	0.25	0.2	0.79	0.99	-73.76
$\gamma = 1.5$	0.85	8.26	No	7.6	**4.2**	4.3	4	0.16	0.16	0.82	0.98	-90.63
$\gamma = 1.6$	*0.74*	*8.26*	*No*	*8.5*	***4.56***	*4.55*	*4.47*	*0.07*	*0.12*	*0.85*	*0.98*	*-121.28*
$\gamma = 1.75$	B	B	Yes	13.5	5.3	**5.2**	5.2	B	B	0.93	0.94	7.07
$f_u = 0.1$	D	D	No	5.4	3.4	3.7	**3.5**	D	D	0.88	0.99	0.35
$f_u = 1$	0.7	7.7	No	7.8	**4.1**	4.1	4	0.04	0.12	0.86	0.98	-61.05
$f_u = 1.3$	*0.74*	*8.26*	*No*	*8.5*	***4.56***	*4.55*	*4.47*	*0.07*	*0.12*	*0.85*	*0.98*	*-121.28*
$f_u = 2$	0.84	9.1	No	10.2	**5.2**	5.1	5	0.15	0.13	0.85	0.98	-265.36
$\delta = 0.81$	D	D	No	9.7	5.46	5.41	**5.27**	D	D	0.92	0.92	0.9
$\delta = 0.9$	*0.74*	*8.26*	*No*	*8.5*	***4.56***	*4.55*	*4.47*	*0.07*	*0.12*	*0.85*	*0.98*	*-121.28*
$\delta = 0.95$	0.86	8.26	No	7.5	**4.55**	4.54	4.02	0.17	0.17	0.82	0.98	-89.18
$\delta = 1$	0.96	8.26	No	7	**3.9**	4.1	3.6	0.26	0.2	0.79	0.99	-71.62

Base case: $\gamma = 1.6$, $z_u = 0.6$, $f_u = 1.3$, $z_\pi = 0.25$, $s_u = 3.9$, $\delta = 0.9$, $t = 2.4$, $q_\pi = 4.2$, $\chi = 0.905$ and $F = 0.2$

Table 2 shows the comparative static analysis for the parameters directly related with the traditional HEI.

How does a change in the preferences for the education output compared to the research output, as described by γ, influence entry? We see that, all else equal, a higher weight given to the education output will decrease the probability that the for-profit HEI enters the market. Although γ does not have a direct impact on the for-profit institution's potential profit as described in Eq. (7), it has an indirect impact through the quality of education chosen by the traditional HEI. A larger γ increases the quality under blockaded entry and decreases the quality chosen under accommodation. When γ is sufficiently large, entry will be blockaded. A higher importance given to education makes entry more difficult for the for-profit HEI. The utility of the traditional institution is increasing in γ. The number of students enrolled in is decreasing up to the point where entry is deterred. It further increases after the point where entry is blockaded. A higher γ also leads to a higher cross subzidiation of research money going towards education.

The tuitio fee f_u, required to study in a traditional HEI, has also an influence on the entry decision of the for-profit HEI. Note that it does not consider the

subsidy received by students to encourage them to go study. A lower fee both mean that it is cheaper for students to go to a traditional HEI and that the institution will, all else equal, receive less funding. A higher f_u has a direct positive impact on the entrant's potential profit. It has however, through the indirect impact on the quality of education chosen (which will increase thanks to the additional funding coming from students), a negative impact on this profit. Overall, we see that the first effect is the highest, at least under this calibration. So, for a higher f_u, entry is more likely. Overall, this has a small positive impact on the utility of the traditional HEI and a negative impact on enrollment. Therefore, the increase in fee will not be fully compensated by the increase in quality that is allowed due to the higher revenues of the HEI. The amount invested in research will also be increasing in f_u.
An increase in δ, the per-student cost of providing education, has no direct impact on the entrant's potential profit. However, it has a positive indirect impact on the probability of entry because it makes it more costly to set a high level of education quality which could potentially deter or blockade entry. This has a negative impact on the utility of the traditional institution and on its enrollment.

Traditional HEI's parameters

Table 3: Numerical analysis: For-profit HEI's parameters

Parameters	ϕ^*	f_π^*	$q_u^B > q_u^D$	q_u^*	U_A^*	U_B^*	U_D^*	π	N_π	N_u	W^1	W^2
$t = 1.7$	D	D	No	6.2	4.55	**4.55**	4.55	D	D	0.87	0.88	3.28
$t = 1.9$	D	D	No	7.3	4.54	4.55	**4.55**	D	D	0.89	0.88	3.28
$t = 2.4$	*0.74*	*8.26*	*No*	*8.5*	***4.56***	*4.55*	*4.47*	*0.07*	*0.12*	*0.85*	*0.98*	*-121.28*
$t = 2.7$	0.86	8.86	No	8.99	**4.57**	4.55	3.35	0.16	0.15	0.84	0.99	-172.46
$q_\pi = 1$	0.88	6.81	No	8.5	**4.56**	4.55	4.3	0.19	0.13	0.86	0.99	-242.7
$q_\pi = 3$	0.79	7.72	No	8.5	**4.56**	4.55	4.42	0.11	0.12	0.86	0.98	-161.8
$q_\pi = 4.2$	*0.74*	*8.26*	*No*	*8.5*	***4.56***	*4.55*	*4.47*	*0.07*	*0.12*	*0.85*	*0.98*	*-121.28*
$q_\pi = 6$	0.66	9.1	No	8.6	**4.55**	4.55	4.5	0.02	0.12	0.85	0.97	-70.13
$\chi = 0.8$	0.79	7.83	No	8.75	**4.56**	4.55	4.42	0.11	0.13	0.85	0.98	-142
$\chi = 0.9$	*0.74*	*8.26*	*No*	*8.5*	***4.56***	*4.55*	*4.47*	*0.07*	*0.12*	*0.85*	*0.98*	*-121.28*
$\chi = 1.1$	0.65	8.67	No	8.15	**4.549**	4.554	4.525	0.001	0.1	0.86	0.97	-88.5
$\chi = 1.3$	D	D	No	7	4.547	4.554	**4.553**	D	D	0.89	0.89	-0.25

Base case: $\gamma = 1.6$, $z_u = 0.6$, $f_u = 1.3$, $z_\pi = 0.25$, $s_u = 3.9$, $\delta = 0.9$, $t = 2.4$, $q_\pi = 4.2$, $\chi = 0.905$ and $F = 0.2$

Table 3 shows the comparative static results for the parameters related with the for-profit institution.
A higher t means that there exists more opacity around the returns to education and this increases the persuasive effect of the for-profit advertising campaigns. It can be derived from Eq. (7) that it has a direct positive effect on both types of institution. A higher t leads also to an indirect negative impact created by the endogenous increase in the quality of education provided at the traditional HEI. We see in Table 3 that the former effect will be bigger. This will therefore make entry more likely. Thanks to this disciplining effect on quality, the utility of the traditional HEI will slightly increase. However, its enrollment will

decrease.
An increase in q_π, the quality of education provided at the for-profit HEI, has a negative impact on the profit of the entrant. Although, entry still takes place for parameters respecting the equilibrium conditions. In this numerical analysis, both the direct and indirect impact go in the same direction. It will also have a small negative effect on the utility of the traditional institution and on its enrollement.
An increase in χ makes it more difficult for the for-profit institution to enter. The direct impact on the expected profit is negative. This cannot be compensated by the positive indirect effect created by the decrease in q_u. This increase has a positive effect on the number of students enrolled in the traditional system.

Public financing parameters

Table 4: Numerical analysis: Public financing parameters

Parameters	ϕ^*	f_π^*	$q_u^B > q_u^D$	q_u^*	U_A^*	U_B^*	U_D^*	π	N_π	N_u	W^1	W^2
$z_u = 0.2$	D	D	No	6.4	4.53	**4.68**	4.57	D	D	0.96	0.96	0.32
$z_u = 0.4$	0.65	7.58	No	7.4	**4.38**	4.59	4.51	0.01	0.11	0.87	0.98	-74.63
$z_u = 0.6$	*0.74*	*8.26*	*No*	*8.5*	***4.56***	*4.55*	*4.47*	*0.07*	*0.12*	*0.85*	*0.98*	*-121.28*
$z_u = 0.9$	0.88	9.04	No	9.6	**4.59**	4.56	4.42	0.19	0.15	0.84	0.98	-223.97
$s_u = 3$	0.82	8.26	No	7.9	**3.8**	3.8	3.6	0.13	0.15	0.83	0.98	-99.9
$s_u = 3.9$	*0.74*	*8.26*	*No*	*8.5*	***4.56***	*4.55*	*4.47*	*0.07*	*0.12*	*0.85*	*0.98*	*-121.28*
$s_u = 5$	D	D	No	9.24	5.51	5.53	**5.48**	D	D	0.92	0.92	-0.11
$s_u = 11$	B	B	Yes	10	10.9	**11**	11	B	B	0.92	0.92	4.64
$z_\pi = 0.2$	0.99	9.85	No	9.1	**4.59**	4.55	4.23	0.3	0.16	0.83	0.98	-121.28
$z_\pi = 0.25$	*0.74*	*8.26*	*No*	*8.5*	***4.56***	*4.55*	*4.47*	*0.07*	*0.12*	*0.85*	*0.98*	*-121.28*
$z_\pi = 0.3$	D	D	No	8	4.54	4.55	**4.55**	D	D	0.89	0.89	-0.14
$z_\pi = 0.4$	B	B	Yes	4.52	4.55	**4.55**	4.44	B	B	0.88	0.88	3.28

Base case: $\gamma = 1.6$, $z_u = 0.6$, $f_u = 1.3$, $z_\pi = 0.25$, $s_u = 3.9$, $\delta = 0.9$, $t = 2.4$, $q_\pi = 4.2$, $\chi = 0.905$ and $F = 0.2$

Table 4 shows the parameters related with the public funding granted to the HEI and to the students going to a traditional/for-profit institution.
Recall that z_u is the share of the tuition fee that the student pays out of his pocket. A higher z_u means that the student will pay a larger share. Although, note that this will not have a direct impact on the HEI's budget. All else equal, a larger z_u has a direct positive impact on entry. However, it is leading to an increase in the quality of education set by the traditional HEI in order to keep attracting students due to the rise of what they have to pay to study. The indirect effect will therefore be negative. Under our configuration, the first effect will be more than compensated by the second effect and entry will be easier the larger z_u. Overall, this creates a negative impact on the enrollment.
The direct per-student subsidy received by the traditional HEI is represented by s_u. An increase in the subsidy has no direct impact on the probability of entry of the for-profit HEI. However, this increase in the budget leads to an increase in the quality of education chosen. This leads to a negative indirect effect on the likeliness of entry. When s_u increases, the number of students enrolled in also increases as well as its utility.

The share of the fee that is actually paid by the student when going to a for-profit HEI is formalized by z_π. A higher z_π has both a direct and an indirect negative impact on the profit of the for-profit institution. This has an unambiguous negative effect on the decision to enter. A higher z_π leads to a decrease in the utility of the traditional institution despite the increase in the number of students it enrolls. This is due to the lower benefits derived from the lower quality of education provided created by the lack of disciplining device from competition.

5.2. Welfare Analysis

The aim of this subsection is to relate this model to government interventions. Abstracting from the issues associated with the opportunity cost of public funds or the externalities created by education, we can show that caring about the democratic objectives of education rather than about the social welfare derived from higher education can lead to a very different welfare appreciation of the model's parameters[13]. Entry will always be preferred when using the first of these two criteria.

The trade-off between the accessibility of the higher education system and of the quality of the programs offered can be shown using two different welfare functions. The first is such that:

$$W^1 = \begin{cases} N_u & \text{if no entry} \\ N_u + N_\pi & \text{if entry} \end{cases}$$

This social welfare function puts forward the importance given to the democratization of higher education. This is often used by office holders. It has the advantage of being easy to compute. It avoids the question of the measure of the quality of the educational program. It also shows quickly the direct impact of a policy change by looking at the number of students enrolled in the beginning of the year.

The second is the sum of the student's net benefits from education, the traditional HEI's utility and the profit of the for-profit HEI minus the amount of public funding invested in subsidizing students and HEIs. For simplicity, all these components are equally weighted. As discussed in Bagwell (2007), the artificial impact of advertising on the student's preferences to go to a for-profit HEI will not be considered in this welfare analysis. Although the overall impact of advertising on welfare can still be positive depending on how it impacts the

[13]The issue behind this welfare analysis is closely related to the problematic of damaged goods (Deneckere and McAfee (2005)), as analyzed in the industrial organization literature. There, a monopolist has to decide whether or not to sell a second good of a lower, damaged, quality. This allows him to implement second degree price discrimination. Even when this second good is more costly to produce, the monopolist may find it profitable to sell it if it sufficiently increases the number of consumers. In this context, it is possible that this new good creates a welfare improvement.

choice of the quality of education. When there is no entry, it is such that:

$$W^2 = \begin{cases} \int_{\theta_s}^{1}(\theta_s q_u - z_u f_u)\,\mathrm{d}\theta_s + U_u - N_u((1-z_u)f_u + s_U) & \text{if no entry} \\ (1-\phi)\int_{\theta_s}^{1}(\theta_s q_u - z_u f_u)\,\mathrm{d}\theta_s + \phi\int_{\tilde{\theta}_s}^{1}(\theta_s q_u - z_u f_u)\,\mathrm{d}\theta_s + \phi\int_{0}^{\tilde{\theta}_s}(\theta_s q_\pi - z_\pi f_\pi)\,\mathrm{d}\theta_s & \\ +U_u + \pi - N_u((1-z_u)f_u + s_u) - N_\pi(1-z_\pi)f_\pi & \text{if entry} \end{cases}$$

Computations for each parameters are in the last two columns of Tables 2, 3 and 4. Note that W^1 and W^2 cannot be compared in the absolute. However, we can analyze the impact at the margin of a change in parameter. It is quite interesting to see that both welfare criterion lead to very different conclusions. Entry is highly valued by the first criteria because it opens the HE system to a larger number of students. Under the second criteria, entry always leads to a lower welfare level. This last result is independent from the impact of avoiding entry on the quality of education chosen (which is positive for an increase in γ, δ or s_u and negative for the other parameters). In this case, entry weights heavily on the public finances and its quality is not sufficient to surpass the costs faced by students attending it.

6. Discussion

The incentives to improve the quality of for-profit education

An important assumption of the model presented in this paper is that q_π is exogenous. Due to the non-monotonic relationship between q_π and the decision to enter the market, it is complicated to endogenize q_π. A simpler framework would be needed. However, it is still possible to show the condition under which an increase in q_π would decrease the expected profit of the entering institution and make entry less likely. The sufficient condition[14] such that Eq. (7) is decreasing with respect to q_π is: $\tilde{\chi} > \frac{z_u f_u + t}{(2t+q_u)z_\pi}$. Under this condition, the for-profit institution will have no incentive to improve the quality of its education if it had the possibility. This condition also shows how, by increasing the minimum quality standard needed to enroll subsidized students, the entry decision of the for-profit institution can be negatively impacted.

The strategic choice of advertising and fees

To explain the high level of advertising expenditures observed in the for-profit sector, we can show that choosing both a high level of advertising expenditures and of fees is optimal for the for-profit institution. As derived from the Dorfman-Steiner approach to advertising (Dorfman and Steiner (1954)), this can

[14]Note that this does not consider the presence of the indirect disciplining effect. It is complicated to find analytical conditions such that $dq_u/dq_\pi > 0$. However, in all the numerical simulations computed with respect to q_π, the disciplinig effect was small and had a negative impact on the entrant's profit (see Table 3).

be done by showing[15] that the student's demand is more sensitive to advertising than to fees, i.e. that the price elasticity of demand $\eta = \frac{z_\pi f_\pi}{q_u - q_\pi + t}$ is smaller than the marginal value of advertising $\mu = f_\pi \frac{z_u f_u - z_\pi f_\pi + t}{q_u - q_\pi + t}$. In our framework, this condition will hold for fees lower than $\overline{f_\pi}$ where $\overline{f_\pi} = \frac{z_u f_u + t + \sqrt{z_\pi (t + q_u - q_\pi)}}{z_\pi}$. As reviewed in Jacobs (2004), the price elasticity of student's demand tend to be low (between 0.03 and 0.37). To our knowledge, no studies have computed the marginal value of advertising in higher education. However, recent works have highlighted a large impact on the student's demand of improving the information available concerning the benefits of higher education (see a.o. Bettinger et al. (2012)).

Perceived vs. effective benefits of education: The role of information

This chapter also highlights an issue related with the difficulty to assess ex-ante what the effective benefits of education will be. The government faces the possibility that for-profit institutions take advantage of this informational asymmetry, especially if students, instead of the traditional higher education system, are subsidized. Due to their governance structure (where professors and students are often part of the decision making process) and their non-distribution constraint, traditional institutions are unlikely to take advantage of the opacity surrounding the benefits of further studying. By improving the information about the returns to education (decreasing t), the legislator will make the entry of the for-profit institution less likely. This could be done, for example, by publishing more extensively data on labor market outcomes and on loan reimbursement rates of former students. The importance of the persuasive effect might also be damaged by critiques made openly in the press (see a.o. The Economist (2010) and The New York Times (2011)).

Supply- vs. demand-side funding

We have shown that, all else equal, an increase in the subsidies given to students makes entry more likely. On the other hand, an increase in the subsidy given to the traditional HEI makes entry less likely. This result would still hold and would even be reinforced if the total amount of per-student subsidy (given to them and granted via their hosting institution) was fixed and the allocation was more going in the direction of the indirect per-student subsidy. We have also assumed that the fee f_u of the traditional institution was exogenous. If the Bennet hypothesis was also observed at the level of the traditional institution, a higher fee created by an increase in the subsidy given to students would further facilitate entry of the for-profit institution. This would reinforce this result.

[15] We abstract from second order effects due to the endogenous quality of education provided in the traditional sector.

7. Conclusion

The objective of this paper was to propose a framework that allows to show the market conditions which facilitate the entry of for-profit institutions in the higher education market. It both highlights (1) that students can still decide to study there even if this human capital decision brings them lower net returns on investment than the other options available and (2) that a legislator might still want to implement policies that would lead to for-profit friendly market conditions. We show how advertising plays a crucial role in explaining the student's decision to study in those institutions. Even when entry has a positive disciplining effect on the traditional HEI, subsidizing students (especially if the money can be used to study in a for-profit HEI) instead of directly subsidizing traditional institutions will facilitate the emergence of for-profit institutions. Even though for-profit HEIs are not desirable from a social welfare point of view, we argue that it still allows the legislator to fulfill his objective of increasing the access to the higher education system to as many students as possible.

To our knowledge, this theoretical model is a first approach to the issue of the entry of for-profit institution in the higher education market. It faces as several caveats that could lead to as many avenues for further research.

First of all, we assumed a very simple production function of education. Further extensions could also consider the role played by peer effects or by student's effort required to have his degree.

Second, as often done in the literature on the competition between HEIs, we supposed that for-profit and traditional institutions were strategically interacting to attract students. Thus far, there is no empirical data to support this hypothesis. However, it is important to consider that, as previously said, policy makers often make this assumption when intervening in this market. In the absence of a competitive disciplinary effect, our welfare conclusions would still hold and would most likely be even stronger. Although some of the parameters might have a different impact on the entry decision than under our analysis.

Third, our assumptions concerning the strategies chosen by the two types of institutions could be endogenized. To allow for this possibility, a simpler framework would be needed.

Finally, as discussed in Scott-Clayton (2012), students are imperfectly informed about the costs and benefits of pursuing their education. In our model, this assumption was only made when students considered the possibility to go to a for-profit HEI. Although, it led for-profit higher education students to a negative ex-post net return to education. This is rather extreme as the marketing practices of for-profit HEIs can, at least partially, solve the information problem faced by some students (the ones badly informed about the net returns to traditional education and for whom for-profit education has still a positive net return). These considerations tell us that the benefits of entry are undervalued according to the second welfare criteria. To be able to consider this, a richer

description of the role of information in the student's decision making process would be needed.

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