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Open University Admission Policies and Drop Out Rates in Europe

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The paper develops a model of educational choices with uncertainty to account for the high drop out rate in countries with open admission policies at university entry. As long as university entry reveals useful information, students have incentives to enroll, update their beliefs and choose whether to continue university or drop out.

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Introduction

Students' performance in tertiary education differs considerably across European OECD countries. The first column of table 1 shows that the percentage of youths that enrols in tertiary education ranges from 32 to 72 percent.[2] However, as the second column of the table indicates, the enrolment does not necessarily nor always leads to proportionally successful graduations.[3] The degree of successful graduation rate depends on the survival rate in university, i.e., the fraction of students completing their studies, displayed in column 3. On average, 67 percent of students in OECD countries complete their studies. However, survival rates feature considerable variation across countries. While 83 percent of those starting university in United Kingdom manage to complete their degrees, only 42 percent of students in Italy complete their studies. The complement of survival rates is the drop out rate, which ranges from 15 to 17 percent in Ireland and United Kingdom to 58 and 41 in Italy and France.

What does explain this variation? Most available research on drop out emphasizes the role of abilities and credit constraints (Altonji, 1993; Eckstein and Wolpin, 1999; Arcidiacono, 2004; Carneiro and Heckman, 2002; Stinebrickner and Stinebrickner, 2008), on the one hand, and labour market outcomes' uncertainty, on the other hand (Groot and Oosterbeek, 1992; Becker, 2006), without mentioning cross countries differences in universities' admission policies. This paper presents a simple model of educational choices with uncertainty on the non monetary cost of schooling, whose information is disclosed during university attendance. Individuals observe the signals and choose whether to continue university or drop out. The conjecture is that open universities admission policies, along with low tuition fees, induce young people to experiment with academic studies.

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[2]Entry rates are expressed as net entry rates, which represent the proportion of people of a synthetic age-cohort who enter the tertiary level of education, irrespective of changes in the population sizes and of differences between OECD countries in the typical entry age.
[3]Graduation rates are computed as the ratio of tertiary graduates to the population at the typical age of graduation.

Policies for access to higher education differ markedly among European countries (Jallade, 1992). In some countries, such as Austria, France[4] and Italy, the diploma gives students a legal right to study in any field in the university sector without universities screening them. In some countries (Germany, Italy and Austria since 2005) admission in a few courses (generally Medicine, Dentistry, Pharmacy) in which the total number of applicants exceeds the number of places available is awarded on the basis of a general selection procedure. In Spain, 70 percent of universities set up a specific examination for admission, whose mark, combined with those obtained in high schools, are used to allocate students to the most selective universities. The others have open admission policies. In Finland all fields of study have restricted entry ("numerus clausus") and universities use a combination of grades and examination tests to select students. In United Kingdom universities apply a rigorous selective process and allocate students among institutions according to their marks; the system is centrally organized in Ireland.

Table 1 – Education Indicator

	Entry rates into tertiary education - 2001	Tertiary graduation rates - 2001	Survival rates into tertiaty education - 2000
Austria	34	17	59
Denmark	44	39	69
Finland	72	41	75
France	37	25	59
Germany	32	19	70
Ireland	38	29	85
Italy	44	20	42
Spain	48	32	77
United Kingdom	45	37	83
Coutry mean	**44**	**29**	**69**

Source: OECD, Type A education

[4] Very rigorous selection by competitive examinations takes place to enter the Grandes Ecoles sector.

A schooling model with uncertainty

This is a standard human capital model for the choice of acquiring higher education with uncertainty over the cost of schooling. Individuals decide whether to enter university (s=1), thus facing an unknown outcome, or access the labour market (s=0), benefiting a known wage[5]. The individual's problem, then, is essentially a two armed bandit problem. One arm represents the unskilled level wage and has a known deterministic value. The second arm represents the outcome from university entry and has a stochastic output. Individuals seek to learn the true distribution by experimenting with the second arm and observing the outcome.

The structure of the decision process is the following. The individual chooses whether to enter in university (s=1) or not (s=0). If she does not enrol, she benefits a safe labour market payoff that always entails w. If she enrols, at the end of the second period she receives a signal which is correlated with the true cost of human capital acquisition, updates her beliefs over the cost of schooling and decides whether to continue university or abandon it. If university is completed, the individual earns a skilled wage, βw with $\beta>1$ in period three. The wage is discounted by a factor $\delta<1$. Choices are made by comparing costs and benefits from each action and by choosing the one that maximizes individual utility.

There is a continuum of young people, which differ in their ability level θ_j. This variable is assumed perfectly observable. Schooling acquisition is composed by a risky non monetary cost of education e, specified in such a way that the non pecuniary cost of acquiring education is lower for abler individuals. His value is ex ante unknown. For simplicity e can assume only two values $e \in \{e_L, e_H\}$, where e_L indicates a low cost of passing exams, whilst e_H a high cost. Individuals have prior beliefs over e. Specifically, assume that before enrolling the cost of education is e_L with p = 0.5 and e_H with

[5]The assumption of a known wage is far from being realistic, as especially in continental European countries individuals experience high uncertainty on the labour market as well. However, for simplicity, I abstract from the possibility that also labour market returns are risky.

probability *1-p*. Normalizing $e_H = \gamma e_L$ with $\gamma > 1$, denote $e_L = e$ Beliefs about *e* change as a function of an observed signal $g \in \{L, H\}$ which is correlated with the true cost of human capital acquisition. The individual observes the signal *g* after university enrolment. It might indicate the number of passed exams at the end of the second academic year and/or the mark awarded if the exam has been successfully passed. Let the signal be informative, meaning that it is more likely that it takes a high value (g=H) for a type with a low cost of education and a low one (g=L) for an individual with a higher cost. These two assumptions imply that information gained at university reduces the noise about the own cost of investment. More formally, assume that:

Equation 1 and 2:

$$P(e_L \mid g = H) = q$$

$$P(e_H \mid g = L) = q$$

With $0.5 < q \leq 1$ As the set of possible outcomes *g* contains only two elements {L, H}, the Bayesian updating rule is straightforward. The individual possible posteriors are $P(e_H|g = H)=q$ and $P(e_L|g = L)=1-q$. The payoff functions of individual *j* at time *t* are defined as follows:

Equations 3:

$$U_{jt=1}(s = 0) = w \qquad (a)$$

$$U_{jt=1}(s = 1) = \delta^2 \beta w - \frac{pe + (1-p)\gamma e}{\theta_j} \qquad (b)$$

$$U_{jt=2}(s = 1, g = H) = \delta \beta w - \frac{qe + (1-q)\gamma e}{\theta_j} \qquad (c)$$

$$U_{jt=2}(s = 1, g = L) = \delta \beta w - \frac{(1-q+q\gamma)e}{\theta_j} \qquad (d)$$

The game is solved backward, starting with the decision taken in the last period. Suppose that the signal received is $g = H$. Once known the signal, the expected utility of the individual from staying in university, conditional on $g = H$, is expressed by Equation (utility c Utility from dropping, conditional on $g = H$, is w. The individual terminates university if the utility from staying is higher than the utility from dropping:

$$U_{jt=2}(s=1 \mid g=H) > U_{jt=2}(s=0 \mid g=H)$$
$$\theta^{*}{}_{j} \mid g = H > \frac{(q+\gamma-q\gamma)e}{(\delta\beta-1)w}$$

All those with observable ability higher than $\theta^{*}{}_{j}$ remain in university. The threshold is increasing in the cost of schooling acquisition (e) and decreasing in the labour market premium associated with university completion (β). An increase in the quality of the information received (q) reduces the threshold above which students continue university conditional on having observed a high signal.

Now suppose that the individual receives a signal $g = L$, the utility changes according to Equation (Equation 3d), whilst the utility derived from drop out stays constant at w. Comparing the two flows of utilities, it can be shown that the student decides to continue if:

$$U_{jt=2}(s=1 \mid g=L) > U_{jt=2}(s=0 \mid g=L)$$
$$\theta^{*}{}_{j} \mid g = L > \frac{(1-q+q\gamma)e}{(\delta\beta-1)w}$$

This threshold is increasing in the cost of schooling and decreasing in the benefit. In this case, better quality of the information increases the threshold as the more precise is the signal, the lower the ability level below which individuals prefer to drop out having received a low signal. The ability of those who receive a high signal is higher than the ability of those who receive a low signal if the signal is positively correlated with the true non monetary cost of schooling; otherwise, the opposite holds.

In the first period, the individual enrols in university if the expected utility gained from enrolment (Equation 3b) is higher than w:

$$\theta^{E}{}_{j} > \frac{[p+(1-p)\gamma]e}{(\delta^{2}\beta-1)w}$$

As p=0.5 and $q > 0.5$, it can be shown that neglecting discounting over one period:

$$1-q+q\gamma < \frac{p+\gamma-p\gamma}{\delta} < q+\gamma-q\gamma$$

The result indicates that when $q \neq 0.5$, entering university is always a preferable choice as it reveals useful information if the sign of the correlation between the signal and the true cost of schooling acquisition is ex ante known. If on the contrary q = 0.5, then the expected utility before entering equals the expected utility one year after enrolment and no advantages are gained from enrolling in university. The actions undertaken can be summarized as follows:

$$s=1 \qquad \text{if } \theta_1^* > \frac{[p+(1-p)\gamma]e}{(\delta^2\beta-1)w}$$

$$s=1, g=L \qquad \text{if } \theta_2^* < \frac{[1-q+q\gamma]e}{(\delta\beta-1)w}$$

$$s=1, g=L,H \qquad \text{if } \theta_3^* > \frac{[1-q+q\gamma]e}{(\delta\beta-1)w}$$

The model allows for the possibility that someone might receive a low signal but still remain in the schooling system. The result shows that individuals can be ranked along their observable ability dimension so that those who terminate university are more talented then those who received a low signal and drop out university. A schooling model with perfect information is not able to account for the fact that some students might drop out from university. As a partial human capital accumulation is not compensated by the prospect of future gains, there are no incentives to enter university without obtaining the degree.

Conclusion

The model is able to rationalize the stylized facts depicted in Section intro, by showing that if students have uncertainty on their ability of schooling acquisition, they might find it optimal to enter university. As long as university enrolment reveals useful information otherwise unknown experimentation is optimal because the *ex ante* expected returns are higher than the costs. Predictions are coherent with the fact that countries with open university admission policies (Austria, France and Italy) feature higher drop out rates than countries where universities apply selective admission procedures (Finland, United Kingdom and Ireland). This argument does not undermine the role of youth unemployment on higher educational choices (Becker, 2006; Bertola, 2007), but complements it highlighting the important role of admission policy. Policies which provide students with better information about their prospects for completing schooling would affect the ex ante probability of success, thereby reducing drop out.

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