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Success/Failure in HE: how long does it take to complete some core 1st. year disciplines?(*)

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1. Introduction and Purpose

Due to the overall development in education brought about by democracy Portugal faced a huge development in Higher Education (HE) since the beginning of the 1980's decade. Actually in a decade (from 1980 to 1990) the Portuguese HE enrolment rate reached the corresponding value for Greece, in 1996 overcame the Belgian one and went on growing until 2003. In this year the trend began to reverse due to demographic evolution (OECD 2006). A very noticeable feature is the high feminisation rate in the Portuguese HE: 61% in 2004, higher than the corresponding ones for most European Union (EU) central, southern, anglo-saxonic countries and even Finland. The increase in the overall demand for HE during the last decades has indeed largely depended upon Portuguese women's enrolment.

. Notwithstanding, despite the precaution required when confronting education outcomes among countries given the diversity of organization models, the net graduation rate for Portugal compares badly with most EU member states (32,3% against 34,9% and 36,4% for EU-19 and OECD averages, respectively, in 2005). Most of all, survival rates in HE are also relatively low when compared to other EU countries: 66% against 75% for Spain, for instance, in the latter year. It would be interesting to compare women's vs men's retention and quitting rates to see if women have lower rates, but unfortunately there is no data available to do it.

Why is this result so disturbing? Because, according to OECD «the survival rate in tertiary education represents the proportion of those who enter a tertiary-type A or a tertiary-

[1] A preliminary unpublished draft of this paper has been presented at the European Conference on Educational Research (European Education Research Association) , University of Gotembourg, September 2008.

type B programme and go on to graduate either from a tertiary-type A or a tertiary-type B programme, relative to the typical year of entrance (OECD 2007).

(*) This paper has been developed in the framework of ISEG Pedagogic Observatory Studies and utilizes its data base.

This means that the Portuguese production function of HE faces considerable deadweight losses, either under the form of retention rates and the one of quitting flows. This might well be a consequence of the Portuguese lowest public spending percentage by student (in US dl, PPP) in HE within the EU [in 2004 only Greece and some of the EU newcomer states performed worse under this point of view (OECD 2007, op. cit)]. Despite the modest public budget allocated to HE, enrolment in public HE institutions amounts for over 75% of all tertiary education registrations in Portugal and the social rate of return for public HE remains high. Portugal displays one of the lowest public spending percentages by student in HE when considering, once again, OECD data: in 2004 only Greece and some of the EU newcomer states performed worse under this point of view (OECD 2007, *op. cit*). But enrolment in public HE institutions amounts for over 75% of all tertiary education registrations in Portugal: likewise the social rate of return for public HE remains meaningfully above what it could become either throughout higher wages and/or potential fiscal returns for government, even under a rather modest public budget allocated to this education level (Belfield 2000).

(Un)success in academic performance at HE 1st cycle becomes more important now that Bologna Chart is on the way for tertiary education. As a matter of fact institutional arrangements became more strict under Bologna, namely throughout shorter time duration for 1st. cycle completion (from 4 to 3 years, in most Portuguese social sciences graduation programmes) though syllabuses' extension and complexity remained identical most of times.

Research carried recently on four Portuguese higher education institutions' MSc. and PhD programmes revealed that there is still a large amount of diversity among institutions relatively to the average time spells required to complete identical degrees. This outcome suggests that under strict time arrangements brought by Bologna Chart the rate of success will widely vary among higher education institutions' post-graduations (Chagas Lopes 2007). Will the same happen with 1st. cycle rates of success? It seems most pertinent to investigate the main factors affecting students' performance at the beginning of higher education.

Given the syllabuses interdependency between sequential graduation years for most subjects it looks advisable to analyse a bundle of 1st. year core disciplines and investigate the

main features behind the corresponding (un)success rates. Actually those disciplines will provide the main qualifications upon which further developments will settle along the graduation programme.

Most research carried on higher education success and failure rates still relies upon cross section methodologies supported by synchronic data most of times. But learning is by itself a rather complex multidimensional and time dependent process, mainly when it coincides with transitions to adult life (Bidart & Lavenu, 2005). Likewise analyses on school success and failure risk neglecting a great deal of the corresponding major determinants, namely most of those which characterize transition to adulthood for women and for men, whenever they do not allow for dynamics.

In this paper we use individual semi-longitudinal data on ISEG students retrieved from the School Pedagogic Observatory as explained below. We set the spell of time needed to successfully complete three 1st. year disciplines, common to the four graduation programmes, as a *proxy* for (un)success. Our main hypotheses are therefore:

- relative success in completing core 1st year graduation subjects, measured throughout the spell of time required by each individual, will be negatively affected by lower SES of the family of origin, poor performance during previous schooling, present family demands and possible income shortages;

- male and female outcomes will most probably differ either relatively to success rates and to time patterns induced by the above determinants.

2. General Framework

Quite diverse impending restrictions can be at stake by the time one attends higher education: self motivation and resilience, programmes scheduling and general accessibility and even employment and income restrictions, eventually combined with family responsibilities, among many other. OECD Examiners' Report on higher education in Portugal stresses that "(…) price is a major determinant of student choice (…)" (OECD 2006: 28), an outcome which doesn't surprise us given the actual average level of tuition fees and public social policy narrowness. Most Portuguese graduation students have indeed to depend on a short fellowship or a place in the labour market, given the relative impact exerted either by direct and opportunity costs upon students' budget. So, income restrictions and the need to cope with them, most of times throughout a paid part time or

even full time job has likewise to be addressed when researching for time allocation by Portuguese HE students.

Besides the above learning obstacles many other determinants occur at earlier stages, the role of which literature and research have been stressing. Individual's family school level, own previous schooling patterns and the role played by education institutions successively attended. Obstacles of the kind have been emphasized mostly by education sociology when trying to approach multiple interaction effects exerted by the interplay between individual and structural factors along life cycle trajectories. Dynamic analyses have been enlightening the meaningful role usually played by previous school trajectory upon future studying and ulterior employment and career opportunities.

Both education sociology and economics of education research have been shedding light on the influence exerted by of origin (father's and/or mother's) and present families' social and educational background (SES) upon school's and employment's success. For upper secondary education, previous research using semi-longitudinal data as well as official reports based upon synchronic data confirm that SES actually exerts a meaningful impact on Portuguese students' opportunities. (Chagas Lopes *et al* 2004; ME-GEPE 2007). Now it concerns us to investigate how far could the same kind of influence go on being conditioning scholar success for tertiary education students. Literature provides empirical outcomes of the fact that the above influence patterns are changing with students' age, gender and school path but also that even though heterogeneously it usually goes on affecting HE patterns (Vandenberghe 2007; Hassink & Hanna 2007). Nevertheless we don't know how those heterogeneous features' influence arise in Portuguese tertiary education neither do we know the strength of that influence along each individual trajectory.

Among those determinants, fathers' and mothers' education level is one of the more important ones: OECD reports that Portuguese HE students have one of the highest social immobility rates as the share of those with tertiary education whose father's education level is tertiary too is extremely high. Nevertheless, father's and mother's school level may well influence differently their children success opportunities, depending upon children's academic path, gender and other features (Pronzato 2008). Therefore it seems advisable to distinguish not only between fathers' and mothers' education level but also between sons' and daughters' performances. Tracing the main gender differences is another objective of this research.

Parents' situation towards activity, employment and occupation are other factors to be isolated and specifically addressed. Most 1st. year graduation students are still living

with parents and dependent upon their family of origin's income. Likewise income failure or budget constraints in the family of origin may affect children's studying opportunities and/or possibly make them search for a paid job in the labour market, anyway affecting the average time spell needed to successfully complete core disciplines. The pertinence of studying these determinants increases now that economic crisis is reaching a peak. Actually the combined effects displayed by the family of origin's socioeconomic status (SES) and present difficulties brought by economic crisis have been also well established: for youngsters in the late teens SES influence tends to increase with bad economic situation, also because it becomes then more difficult to get a job. (Belley & Lochner 2007).

All those determinants interplay to foster not only educational access and success (or failure) material requirements but also background values, beliefs and motivation which shape life cycle trajectories (Plug 2002; Black, Devereaux & Salvanes 2004). We will not deal with this latter kind of features although we are aware of their impact upon individual school trajectories either directly or throughout their impact upon other variables like SES.

School trajectories and relative success previous to the transition to higher education have extensively been investigated by the reference literature. For Portuguese upper secondary students ME-GEPE shows that girls exhibit lower age deviations relative to the expected age and higher scores in previous trajectories than boys. The report stresses that girls' socialization is more prone to school values than boys' a feature which is also associated with the higher school expectations generally girls develop when compared to boys. Another line of argumentation emphasises the fact that girls invest more in school given they are discriminated in other fields like labour market (ME-GEPE 2007, *op. cit.*).

More recently, in the eve of Bologna agreement, research concerning higher education has been developed in some EU countries (Noyes 2003; Ammermüller 2005). No study of the kind has been developed for Portugal as to our knowledge. Therefore retention episodes and their frequencies either during basic or in secondary education have to be investigated in the framework of research on success rates in the Portuguese HE 1st. cycle. Mobility between school establishments in school cycles previous to tertiary education must be addressed as well.

Research on the Portuguese upper secondary and tertiary patterns has been providing evidence that confirms the influence exerted by main individual characteristics as age and gender upon school success (Chagas Lopes *et al* 2004, *op cit*; Chagas Lopes *et al* 2005). Amâncio (2005) and Perista et all (2004), among other, focus on gender role upon

graduation (and also employment opportunities) in Portugal. As we have been referring the feminisation rate among most Portuguese HE programmes is consistently increasing, despite the enrolment overall downturn trend along the last years. Will the time restrictions behind (un)success equally impart upon women's and men's trajectories? How far will SES, previous school trajectories and present family's requirements differently affect women' and men' efforts to complete core graduation disciplines? Given the strong impact Portuguese students actually face when in transition from upper secondary to HE, will we observe any gender patterns behind those impact and transition outcomes?

Summing u: we intend to assess the joint effect on the amount of time required by each individual to complete a set of three core 1st year disciplines of the above mentioned determinants. We also intend to systematically investigate gender patterns associated with those time spells. Finally, as we set time required to successfully complete each matter as a *proxy* for the (un)success rate, we expect to be able to derive women's and men's success rates main determinants.

After the Introduction (1.) and the General Purpose (2.) we will develop the guidelines for the Theoretical Background in Point 3. Data and Work Sample will be explained in Point 4. after what we will develop Analysis (Point 5.): Contingency Analysis (5.1.), Cox Regression (5.2.) and Discriminant Analysis (5.3.). We finish with some Conclusions and Policy Implications.

3.Theoretical Background

Individual longitudinal trajectories have for long deserved increased attention among research developed in labour economics[2].

[2] See, among other, Ben-Porath 1967; Heckman & Macurdy 1980; Albrecht *et al* 1991.

This growing relevance occurs in the framework of human capital theories criticism and inscribes into a broader modern approach for which the role played by life cycle theories attracts an increasing concern. The latter main purposes encompass the identification of the major interactions which take place between education/training and work/earnings (and family, sometimes) trajectories along individual life cycles.

In this paper we take life cycle theories as the main theoretical framework as we are concerned with dynamic transitional processes instead of single turning points and intend to assess the interplay between processes which are usually taken as independent and rather static like the interaction between schooling, situation towards labour market and own family raising. Educational success and failure are the outcome of dynamic and complex interacting features that spread quite diversely along individual's trajectories and whose effects impart along larger or shorter spells of time. Applying life cycle theories to education appears to be quite advisable whenever research concerns the effects on learning and schooling of factors which affect the amount of time needed to complete given disciplines. As previously mentioned we measure (un)success in tertiary education by the spell of time required to complete a bundle of three core subjects previously established.

To identify a set of determinants influence upon time spells which are required to complete a given degree applying duration models seems to be particularly adequate. Cox proportional hazard models are frequently used to adjust duration models mostly because they do not impose any specific probability distribution for time, actually a major difficulty most of times.

We let T represent the duration spell needed to complete a given graduation matter, being T a random variable with distribution function $F(t) = P(T \leq t)$. Therefore, the survivor function is $S(t) = P(T \geq t)$ and the corresponding hazard function is $h(t) = f(t)/S(t)$, with $f(t)$ the density function for T. In our present research the hazard function represents the instantaneous probability of completing the discipline at time *t*, given the individual was attending it up to that time. As to the explaining variables, or covariates, (*x*), their joint influence intervenes under the form:

$$h(t|x) = h_0(t)e^{x'\beta}$$

where x is the covariates vector, β is a vector of unknown parameters, and $h_0(t)$ is the baseline hazard function for an individual with x=0, i.e., the term for previous (initial) conditions (Lawless 1982; Kachigan 1986).

Nevertheless hazard proportionality was not strictly confirmed by our data as it might be. Therefore we decided to confirm results obtained by CR throughout other statistical procedures as Discriminant Analysis (DA). In DA at least one discriminant function, *D*, is obtained throughout a linear combination of discriminating (independent) variables, *x*, such that

$$D = a_1 x_1 + a_2 x_2 + ... + a_n x_n + c$$

where a_i are the discriminant coefficients, x_i the discriminating variables, and c a constant. This is analogous to multiple regression, but the discriminant coefficients, $a_{i,}$, maximize the distance between the means of the dependent variable.

In the next point we provide further explanation for adjustment methodologies either for CR and for DA.

As covariates we used a same set of variables which can be ranged as follows:

- some individual characteristics, like age, gender, place of birth and nationality;
- indicators of the SES of the family of origin, like number of sibling, parents' education level and theirs situations towards occupation and employment (always fathers' and mothers' separately);
- indicators of the individual's previous school trajectory, as the number of grade retentions during basic and secondary education if any, and the mobility flows between scholar institutions;
- some intervening determinants as individual's present situation towards employment, his/her civil status, husband's/wife's education level, occupational situation and other characteristics of the present family, as well as the scores obtained by the individual in the other two core disciplines.

4. Data and Work Sample

We used semi-longitudinal data on ISEG students retrieved from the Pedagogic Observatory database. This Observatory combines data delivered by the Ministry of Education relative to the students' previous schooling and data on enrolment procedures and examinations scores from ISEG files. We have observations on 2780 students of the three graduation years and the four graduation programmes (Economics, Management, Finances and Mathematics).

By the time of this paper writing only examinations corresponding to the first semester of 2007/2008 had been achieved. This would mean that first year first timer students only had one opportunity to complete the three core disciplines. Therefore we decided not to work with these students' data. Likewise our work sample in this paper concerns first year redoubling students plus second and third graduation year ones, which amounts to 2228 individuals. Data on explaining variables, or covariates, has been described at the previous point. The main characteristics of the work sample are the following:

- the feminization rate is 40,2% and 80% are under 25 years. Around 89,2% were born in Portugal and 94,7% are Portuguese. All these results closely replicate the universe characteristics.

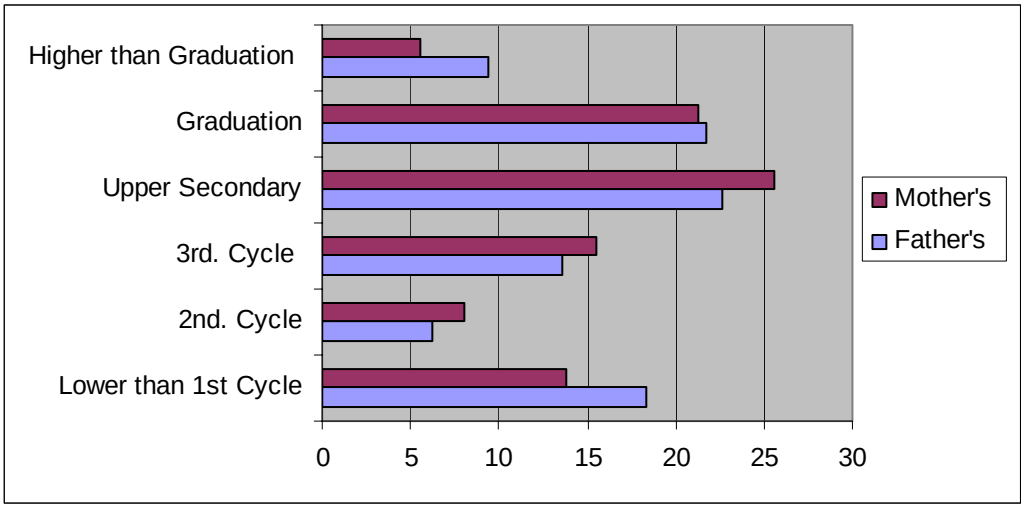
- as expected most students (97,7%) are single and only 2,1% are married or living in a couple. A large majority of them – about 75% - lives usually in Lisbon or within a 60 km vicinity.

- the large majority among all students in the work sample (70,5%) performs no paid occupation; 11,2% have a part time job and 10,6% a full time one.

- as to the graduation field 37,6% are enrolled in Economics, 49,8% in Management (these two scores being relatively under and above the universe's corresponding scores, respectively), around 6,9% in Finances and 5,7% in Mathematics.

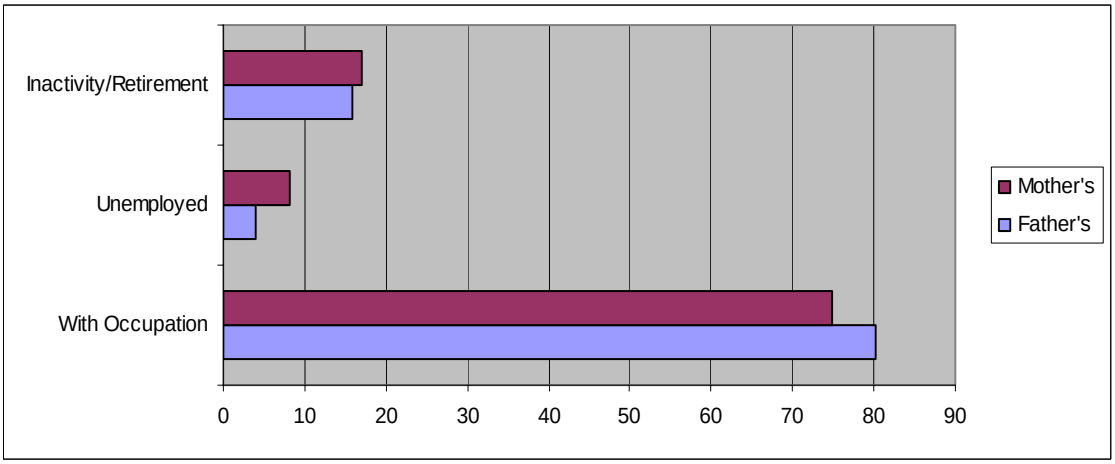
- concerning the SES of the family of origin, most of them (69,9%) are the single child, fathers' and mothers' school level depict an almost normal distribution as expected: looking to Figure 1 we can observe that the only meaningful deviation from that pattern is the large share of students' fathers which school level lies under the 1st, cycle.

Figure 1: Father's and mother's school level



Most fathers (80,2%) and mothers (74,8%) were employed in the beginning of the 2007/2008 scholar year; more mothers than fathers suffered from unemployment (8,1% against 3,9%, respectively) and were inactive or retired from the labour market (15,9% for fathers, 17,1% for mothers). The above outcomes replicate quite closely Portuguese average situation towards employment in the corresponding period of time, except for fathers' unemployment share which appears to be lower than the average one.

Figure 2: Father's and mother's situation towards employment



- entrepreneurship is higher among fathers (28,7%) than among mothers (13,8%). Most fathers and mothers are employees (65,6% and 68,0%, respectively). We must notice the meaningful share of family non paid workers among mothers (18,2%).

- in what concerns students' previous school trajectory a large majority of them (98,5%) has been relatively successful in basic and lower secondary and 82,4%, in upper secondary did not repeat any grade or year. Among the ones who repeated upper secondary 13,7% got one year retained and only 3,7% were retained for two or more years. Among all students in our sample 95,5% - e.g. Portuguese and foreign students – completed upper secondary in Portugal. It must be noticed, nevertheless, that about 23,7% among the work sample students has interrupted studies for at least one year between upper secondary conclusion and enrolment in ISEG. This outcome bears several meanings: either they had to repeat access examinations in order to get an higher score compatible with *numeri clausi* at ISEG or they had been in another University before moving to ISEG (by option or by another reasons) or they simply ceased studying for a spell of time, possibly for income constraints. This situation should deserve a deeper attention in future research.

5. Analysis

We started by computing three dependent variables, TE1, TM1 and TIG, representing the amount of time taken to complete Economics 1, Mathematics 1 and Introduction to Management, respectively. We did not take each individual's age as one of the independent variables given its strong correlation with the dependent ones.

In every statistical analysis we systematically adjusted separately for women and for men. According to reference literature in this subject this is the correct procedure since gender is not an "explaining variable" but (the real) explaining variables are not gender neutral. That is why we compare women's and men's pattern effects by developing separate adjustments.

5.1. Contingency Analysis

As a first exploratory insight we used Contingency Analysis (**CA**) and obtained the following variables as the ones for which statistical test scores revealed meaningful associations with TE1, TM1 and TIG (See Appendix 1):

- individual characteristics (besides gender and age): nationality (Nac_) and country of birth (Nat), only for men and for TM1 and TIG;
- SES of the family of origin: mothers' school level (HLM), by far one of the most important determinants which affects mostly female students patterns, except for Mathematics 1, while fathers' school level only associates with TIG and for men; mothers' and fathers' situation towards employment (SitEM and SitEP) display very meaningful association scores but not parents' situation towards work. Deceased parents (MãeFl and PaiFl) seem to exercise an equally important role, especially in what has to do with Mathematics 1 for both male and female students and Economics 1 for the former.
- present scholar situation, namely in what concerns the graduation programme and the scores obtained in one or both of the other two core disciplines reveal a very strong association.
- individuals' situation towards employment and civil status display very high association scores.
- despite exerting a meaningful influence, previous scholar trajectory appears to be less relevant according to the scores for variables relative to eventual retention – during the basic, RepB, or during the secondary, RepS – to the number of retention situations – N RepB, N RepS – and to the mobility flows – MovB and MovS. Nevertheless this group of variables reveals rather strong association scores with time for Mathematics 1 and especially for male students for whom we also observe a meaningful impact displayed by the country where upper secondary education had been completed (País).

The above outcomes are not surprising. Most students are single and probably living with their parents as we have already referred. Therefore they are dependent upon the income level of their family of origin and inherently upon the main disruptions it may suffer: father's or mother's unemployment, their unemployment spells and ability to reemploy for which either parent school level represent robust *proxies*; and also father's or mother's death have a very strong influence upon students success opportunities. This "income effect" is observable when we cross compute individual's situation towards employment with either parent's (or both) one. For those who got married or living in a couple civil status (EstCiv) association with own situation towards employment (SitE) appears obviously to be strong.

A "graduation programme" effect seems to be quite evident as well. Actually, the spell of time needed to successfully complete each one of the core subjects seems to be quite contingent upon the specific graduation programme which students chose among the four possible ones and also upon the relative success they obtained in the other core disciplines. The three core disciplines are common to the four graduation programmes and share generally the same syllabus and professors' team. Nevertheless students' motivation and formal qualification strongly differ among graduation programmes a feature which could well stay behind this effect.

Gender patterns are quite obvious as well under the form of a much higher diversity of time length determinants for men than for women as it can be seen from Appendix 1.

The specific graduation programme appears to be systematically much more influent for male than for female students. Some other variables associated with the first segment within scholar trajectories, as country of birth and relative success during 1st cycle education - as retention and mobility situations - seem to be more determinant for male students too; we should notice that the latter variables have frequently been taken as *proxies* for ability. Death of one or both parents and mothers' school level are by far much more influent for female students, as well as relative success during upper secondary, own situation towards employment and scores obtained in the other core disciplines. Civil status, on the contrary, seems to impact more upon male students' trajectories.

Having interrupted studies between the end of upper secondary and ISEG enrolment also appears to be well associated with time needed to complete either E1 or IG, although not with Mathematics 1. Breaking down by gender we observe that for female students this result only holds for E1 while for male students it holds for the three core disciplines.

Can we infer from the above outcomes that young female students are more conditioned by their family of origin's characteristics, namely income and general support, as well as by their own scholar objectives which are more ambitious than comparable young men's ones, as a general rule? And that young male's school trajectories seem to be more shaped by cognitive features (like ability and adequate vocational choices) followed by own family responsibilities once married?

Of course we are not drawing such a conclusion from this single analysis. Anyway the above outcomes confirm evidence for other countries on male and female students' patterns in higher education. However the results so far obtained do not inform us about the relative effect of those variables when assembled in a model neither do they provide any measure of the magnitude of that effect.

5.2. Cox Regression Adjustments

For that purpose we then tried **CR** adjustments. For the already mentioned reasons we stratified by gender anyone of the essays. Also we dealt separately with each one of the core disciplines and the corresponding dependent variable – TE1, TM1 and TIG - because they are quite heterogeneous in what concerns average retention rates and scores as we can learn from ISEG historical synchronic data. We should remember that in the following analysis we didn't consider 1st year 1st timer students.

Whenever possible we used in the CR adjustments both the Enter and the Loglikelihood (LR) methods, the latter being more robust but sacrificing more explaining variables. We used the same set of covariates as in CA. Too many missings in the variable relative to interruptions between upper secondary conclusion and enrolment in ISEG prevented us from including it in the model. Tables in Appendix 2 display the main results - the scores for the coefficients (ß), corresponding exponential effect [Exp (ß)] and Wald test‡ for the meaningful covariates:

Table 1: Cox Regression results for TE1

Method "Enter"	Covariates: MãeFl, PaiFl, RepB, MovS, País, NI
Method LR	Covariates: SitEP, SitTMãe, MovB (Pub/priv)

Table 2: Cox Regression results for TM1

Method "Enter"	Covariates: Graduation Programme, SitTMãe, MovS, Civil Status, NI
Method LR	Covariates: Score obtained at Economics 1

Table 3: Cox Regression results for TIG

Method "Enter"	No Meaningful Results
Method LR	Covariates: Graduation Programme, MovS

‡ As generally advised we only retrieved covariates for which the Wald test score was lower or equal to 0,05.

Being much more demanding than exploratory analyses, like CA, fewer covariates pass the CR tolerance levels, namely the Wald test. Nevertheless we can see that most explanatory influences displayed by CR adjustments coincide with those obtained by CA. This is particularly true for family of origin's SES: father's and/or mother's decease (MãeFl, PaiFl), their situation towards employment and work (SitEP, SiTMãe), number of siblings (NI); students' relative success along previous school trajectory: having or not repeated and/or moved during basic (RepB, MovB), having or not faced mobility between institutions during Secondary (MovS, which influences all the adjustments) and country in which upper secondary has been completed (País); with present studying situation: graduation programme. To a lesser extent also the score obtained in (at least) one of the other core disciplines and civil status seem to display a non negligible influence.

As a statistical tool used to adjust hazard survival models CR displays survival tables. Given that we stratified by gender all the adjustments differences in survival rates for women and men come straightforwardly. Notice that by "survival rate" we mean here (according to hazard survival models literature) the probability that an individual do not complete a given state at a moment T (will survive) conditional on having been **continuously** in that state until then[§]. Looking to the tables displayed in Appendix 2, in which code for women is 2 and for men 3, we observe that only for Economics 1 female students took more time than their male counterparts: actually it is the only situation where female students group extinguishes at time break 10 instead of time break 9 as happened with men.

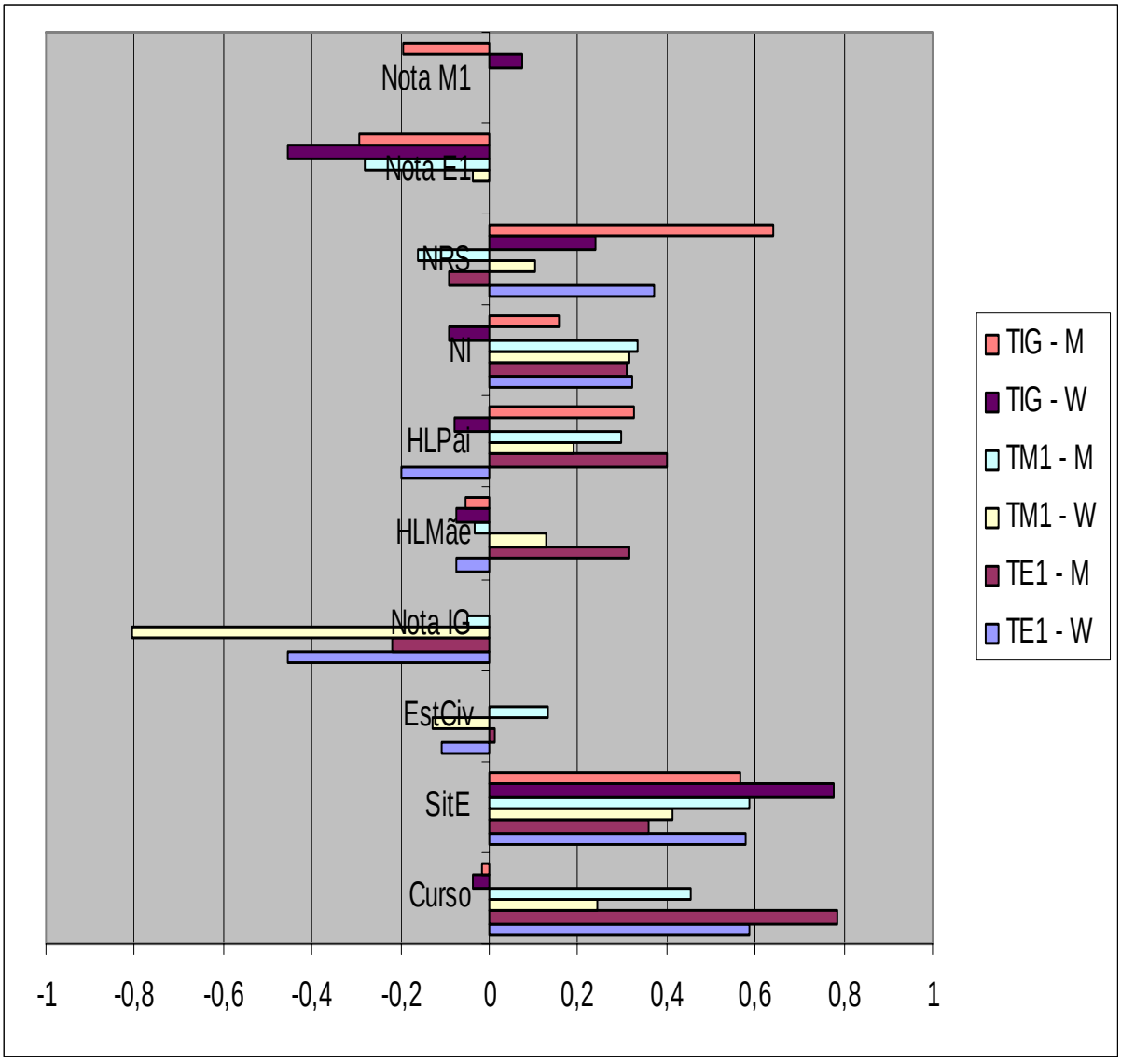
5.3. Discriminant Analysis

For Discriminant Analysis **(DA**) we eliminated cases for which time needed to complete the subjects was higher than 4 years because of he corresponding frequencies scores. As usually we decided of the goodness of each adjustment on the basis of the percentage of correctly classified cases, Qui-square significance level, Wilk's lambda and canonical correlation. For each discipline two adjustments were developed, one for male

[§] Actually we have a problem with that "continuity" requirement because in the work sample with which we are working we cannot control for possible interruptions which might occur between the 1st. enrolment date at ISEG and the last/present one. This is a question which requires further research.

and another for female students. Appendix 3 presents the variables and corresponding adjusted coefficients retrieved from the structure matrix, the magnitudes of the latter being depicted in the next Figure:

Figure 3: Relative influence displayed by Discriminating Variables



Legend: TIG – Time to complete IG; TE1 – Time to complete E1; TM1 – Time to complete M1; W – women; M- men; Nota M1 (Score in M1); Nota E1 (Score in E1); Nota IG (Score in IG); NRS (Nº retentions Secondary); NI (number of siblings); HLPai (Father's school level); HL Mãe (Mother's school level); EstCivil (Civil Status); SitE (Individual's Situation towards employment); Curso (Graduation Programme).

DA results confirm most previous ones. Meaningful indicators for own family SES are now father's and mother's school level (HLPai and HLMãe, respectively), which possibly encompass both parents' situation towards employment, and number of siblings (NI). Father's school level positively affect male students' amount of time needed to successfully complete all the disciplines as well as Mathematics 1 for female, whilst for most situations mothers' school level influence has a decreasing influence. Number of siblings, probably a *proxy* either for family's per capita income or cores intensity, almost always exerts an increasing influence. Previous school trajectory, here introduced throughout the number of retentions during upper secondary (NRS) - a variable which sometimes is also taken as a *proxy* for ability - always increases time that female students take to complete the three disciplines and also IG in the male's case. As to the indicators of present scholar success, e.g., the scores obtained in at least one of the other two disciplines, there is an evident opposite effect displayed by the scores obtained in Economics 1 upon the duration taken to complete both M1 and IG and a somewhat unclear effect displayed by the scores obtained in Mathematics 1, whilst no meaningful effect was associated with IG under this light. The effect displayed by the specific graduation programme (Curso) in which individuals are enrolled is by far one of the most important ones, for both gender and for all the graduations fields, therefore confirming the "graduation programme effect" that we had already observed. Situation towards employment (SitE) displays the most meaningful magnitude for most pairs (gender*graduation programme) therefore confirming the influence exerted by present income conditions for most students.

Three discriminating variable patterns exhibit meaningful symmetric signs when comparing both sexes: number of retentions during upper secondary (NRS), mother's and father's school level (with two rather modest exceptions for TIG and Mathematics 1) and civil status. Number of retentions during high school doesn't seem to provide an unique explanation: either it would mean for male students (not for female ones) the acquisition of improved skills in Mathematics and Economics and henceforth lower time spells to complete the corresponding disciplines now in the University; or it indicates the presence of actually less able students, namely in what concerns IG and female students in Economics. For female students (except those in Mathematics 1) their parents' human capital – specially their fathers' one - seems to play the role of an asset, probably an income indicator as well, which most young women can rely upon to develop their school objectives in this pre-adulthood phase. In the meanwhile most male students seem to use this same capital to extend their teenage time. Would this hypothesis be valid and young female and male would accordingly face differently transition into adulthood: the investment made in education would imply for the former a

smoother transition and a better accommodation of civil status changing and new family chores. While for young men marriage or living in a couple would imply a turning point and the beginning of responsibilities assuming therefore a much higher difficulty in making new life compatible with studying requirements.

6. Conclusion and Policy Implications

Success and survival rates in Portuguese Higher Education (HE) are low when compared to most developed countries. Besides social and economic development implications also social rates of return are affected giving the high share that public education represents among Portuguese HE. It is not expected that the full implementation of Bologna Chart will improve by itself this situation.

A great deal of failure determinants are encountered by students in some of their 1st. year's core disciplines which strongly shape graduation programmes as a whole. Likewise we focused upon the production function of three among those disciplines which are common to the four graduation programmes at ISEG. As a proxy for the relative easiness/difficulty we took the spell of time needed to successfully complete each one of those three core disciplines. We state the hypotheses that relative success will be negatively affected by lower social and economic background of the family of origin, poor performance during previous schooling, own family demands and possible income shortages. And also that male and female success patterns would differ on account of most of the above determinants.

In all the statistical analyses we obtained a set of common influences: the social and economic characteristics of the family of origin – either mother's and/or father's school level or their situation towards employment and activity, in some adjustments also parents' decease and number of siblings; the relative success during previous scholar trajectory, among which the number of retentions during basic and/or secondary education; the specific graduation programme which students are attending as well as the scores obtained in each one/another of the two other core disciplines which display some of the more relevant influences; civil status and, specially, own situation towards employment, whose magnitude lies among the more important ones.

Most influences seem to affect similarly male and female students. This is the case for deceased parents and number of siblings which increase for both sexes the amount of time needed to complete the disciplines. This result seems to mean that income restrictions and the

volume of chores to perform inside the family of origin are adverse to students' success. Also, the scores obtained in the other core disciplines, the specific graduation programme and own situation towards employment display similar effects for male and female students: the first one being negatively correlated and the second and third positively correlated with the amount of time they need to successfully complete the discipline under observation. From these results it appears that an ability effect (tested throughout the scores in the other disciplines) would affect positively success, an institutional or organizational determinant (e.g. the specific graduation programme) and an income and time restriction one (associated with individual's labour market occupation) could contribute to reduce it, in either case for both female and male students.

Three specific variables display almost systematically symmetric influences for male's and female's success: number of retentions during upper secondary, parents' (especially father's) school level and civil status. The first outcome does not seem to accommodate a single explanation: for male students it appears that repeating during secondary endows them with improved skills in Economics and Mathematics a feature which will translate into a quicker success once in the 1st. year of graduation; for female students in Economics and both sexes IG students it seems to go in pair with less ability. The second and third outcomes, taken together, defy us to confirm in a further research the following pattern: for most girls (except for those in Mathematics 1) their parents' human capital and probably the corresponding income is seen as an asset which they invest to further develop their school programmes and their more ambitious objectives during pre-adulthood; on the contrary, most young men seem to rely upon that same capital to extend teenage time… This result goes in line with most research which enlightens gender differentiated patterns in the transition into adulthood: for women, the investment made in education, among other factors, would imply a smoother transition and a better accommodation of civil status changing and new responsibility and family chores, whilst for young men raising one's family and bearing inherent responsibilities represents an harder turning point and a much higher difficulty in making new life compatible with studying requirements.

Some other features should deserve further research as well. This is the case of study interruptions between upper secondary conclusion and enrolling into university. As there are diverse reasons behind these interruptions, very different explanation and policy measures could be then at stake. Institutional restrictions, as *numeri clausi*, could well be one of them, leading secondary students to repeat final examinations in order to obtain the required score. Very different evaluation and classification criteria between public and private secondary

schools should then be scrutinized as well under this point of view. Also interruptions and quitting after enrolment in university must be further researched. For other Portuguese universities we know that behind most quitting situations there are actually mobility flows among universities. Interruptions have been less studied; it would deserve a thorough investigation now on the basis of semi longitudinal data.

It particularly concerns us the "graduation programme effect" which we have obtained in this research. As the institutional entry requirements are the same for the four graduation programmes at ISEG, we must further investigate on students' characteristics, on one hand, and on the programmes' organization and pedagogy specificities, on the other, in order to shed light on this so overwhelming influence. Anyway, it seems to be much advisable to implement supletive classes and a mentoring system especially addressed to 1st. year students and to the learning of core disciplines.

In every phase of the students' trajectory, either when living with their parents or once married or living in a couple, an important income effect seems to be affecting school success, as discussed. Therefore, it seems to be large scope for a stronger social policy addressed to HE. Alleviating tuition fees should not be an advisable procedure because of the HE institutions strong lack of resources and the need to encompass students and society in a shared responsibility; but public investment in Portuguese HE is still relatively modest as we said. It seems to us to be quite advisable to reinforce public intervention in scholarship and allowances policies, mainly in the present critical economic situation.

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APPENDIX 1

Contingency Results for TE1 (Women):

	SitE	SitEP	HLM	SitEM	RepS	MovS	Curso	Nota IG
Qui-sq. n.s.	0,000	0,004	0,050	0,039	0,073	0,021	0,032	0,000
Phi	0,417	0,323	0,497	0,290	0,198	0,215	0,246	0,579
Cramer	0,241	0,186	0,176	0,167	0,140	0,152	0,142	0,193
C. Contingency	0,385	0,307	0,445	0,278	0,194	0,210	0,239	0,501

Contingency Results for TM1 (Women):

	SitE	PaiFl	MãeFl	RepB	MovB	RepS	MovS	NI	Curso	Nota E1
Qui-sq n.s.	0,000	0,002	0,000	0,002	0,000	0,000	0,001	0,001	0,025	0,001
Phi	0,526	0,273	0,332	0,287	0,303	0,301	0,299	0,517	0,257	0,699
Cramer	0,304	0,193	0,235	0,203	0,214	0,213	0,211	0,231	0,182	0,211
C. Contin-gency	0,466	0,263	0,315	0,276	0,290	0,288	0,286	0,459	0,249	0,573

Contingency Results for TIG (Women):

	HLM	SitE	Nota E1
Qui-sq n.s.	0,023	0,000	0,000
Phi	0,435	0,328	0,815
Cramer	0,178	0,190	0,308
C. Contingency	0,399	0,312	0,632

Contingency Results for TE1 (Men):

	EstCiv	SitE	MãeFl	SitEM	RepB	MovB	RepS	MovS	Nota M1	Nota IG	Curso
Qui-sq n.s.	0,000	0,000	0,008	0,002	0,042	0,004	0,026	0,024	0,017	0,000	0,000
Phi	0,551	0,320	0,209	0,278	0,193	0,216	0,198	0,199	0,575	0,556	1,049
Cramer	0,275	0,185	0,148	0,161	0,136	0,153	0,140	0,141	0,174	0,168	0,371
C. Conting.	0,483	0,305	0,205	0,268	0,189	0,211	0,194	0,195	0,499	0,486	0,724

Contingency Results for TM1 (Men):

	Nac	EstCiv	SitE	PaiFl	SitEP	SitEM	RepB	N RepB	RepS	N RepS	Mov S	País ConclS	NI	Curso	Nota E1
Qui-sq NS	0,006	0,000	0,002	0,039	0,023	0,002	0,009	0,002	0,049	0,002	0,049	0,001	0,000	0,000	0,00
Phi	0,214	0,422	0,313	0,205	0,285	0,315	0,229	0,315	0,210	0,314	0,210	0,469	0,480	1,064	0,63
Cramer	0,214	0,211	0,181	0,145	0,165	0,182	0,162	0,182	0,149	0,181	0,149	0,166	0,277	0,376	0,17
C. Conting.	0,210	0,389	0,299	0,201	0,274	0,301	0,223	0,300	0,206	0,299	0,206	0,425	0,433	0,729	0,53

Contingency Results for TIG (Men):

	Nat	EstCiv	SitE	HLP	HLM	StrabM	RepB	N RepB	MovB	RepS	MovS	Curso	Nota E1
Qui-sq NS	0,000	0,000	0,024	0,040	0,012	0,055	0,002	0,008	0,019	0,025	0,014	0,000	0,000
Phi	0,433	0,525	0,217	0,361	0,375	0,176	0,199	0,230	0,179	0,176	0,182	1,036	0,648
Cramer	0,153	0,235	0,125	0,147	0,153	0,124	0,141	0,133	0,127	0,125	0,129	0,366	0,205
C. Conting.	0,397	0,465	0,212	0,340	0,351	0,173	0,195	0,225	0,176	0,174	0,179	0,720	0,544

Legend: TE1 – Time to complete E1; TM1 – Time to complete M1; TIG – Time to complete IG; SitE - Individual's Situation towards employment; SitEP- Father's situation towards occupation; SitEM – Mother's situation towards occupation; StrabP – Father's situation towards labour market; StrabM – Mother's situation towards labour market; HLM – mother's school level; HLP – father's school level; PaiFl – Father's decease; MãeFl – Mother's decease; PaiInc.- Unknown Father; NI – number of siblings; RepB, RepS – having had retentions during Basic (B), during Secondary (S); NRepB, NrepS – number of retentions during Basic (B), during Secondary (S); MovB, MovS – mobility between school establishments during Basic (B), during Secondary (S); Curso- Graduation Programme; Nota E1(M1, IG) – Score obtained in E1 (M1, IG); EstCivil – Civil Status; Nat – Naturality; PaísConclS – Country where secondary was completed; AI1º-1ª- scholar year relative to 1st year 1st enrolment; MudPubPriv, MudPrivPub –moving from public to private/ private to public schools. Qui-sq NS – Qui-square significance level; C. Conting.- Contingency Coefficient

APPENDIX 2

CR – TE1 –ENTER

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)	95,0% CI for Exp(B)	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
AI1º-1ª	-,441	,021	441,191	1	,000	,643	,617	,670
Curso	-,004	,012	,100	1	,751	,996	,974	1,020
Nat	-,007	,005	1,903	1	,168	,993	,982	1,003
Nac	,006	,011	,269	1	,604	1,006	,985	1,027
EstCivil	,364	,178	4,199	1	,040	1,439	1,016	2,038
SitE	-,021	,045	,212	1	,646	,980	,897	1,070
PaiFl	,026	,147	,031	1	,859	1,026	,769	1,370
Pai_Inc	,203	,384	,280	1	,597	1,225	,577	2,601
HLP	-,015	,017	,760	1	,383	,985	,953	1,019
SitEP	,095	,037	6,512	1	,011	1,100	1,022	1,183
StrabP	-,045	,057	,618	1	,432	,956	,856	1,069
MãeFl	,004	,239	,000	1	,985	1,004	,629	1,605
HLM	,015	,019	,649	1	,420	1,015	,979	1,053
SitEM	-,243	,047	27,164	1	,000	,784	,716	,859
StrabM	,197	,051	15,228	1	,000	1,218	1,103	1,345
RepB	-,156	,556	,079	1	,779	,856	,287	2,546
NRepB	-,140	,414	,114	1	,735	,869	,387	1,956
MovB	,147	,080	3,390	1	,066	1,158	,991	1,354
RepS	,145	,188	,594	1	,441	1,156	,800	1,670
NRepS	,162	,145	1,252	1	,263	1,176	,885	1,561
MovS	-,007	,110	,004	1	,952	,993	,801	1,232
MPub_Priv	,586	,252	5,395	1	,020	1,797	1,096	2,948
MPRiv_Pub	,293	,141	4,298	1	,038	1,340	1,016	1,768
PaísConclS	,000	,012	,001	1	,978	1,000	,976	1,024
NI	,009	,049	,032	1	,857	1,009	,916	1,111

(For Legend see Appendix 1)

CR-TE1-LR

Variables in the Equation

		B	SE	Wald	df	Sig.	Exp(B)	95,0% CI for Exp(B)	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Step 1	AI1º-1ª	-,382	,014	726,750	1	,000	,682	,664	,70
Step 2	AI1º-1ª	-,401	,015	702,803	1	,000	,670	,650	,69
	SitEM	-,140	,037	14,190	1	,000	,869	,808	,93
Step 3	AI1º-1ª	-,414	,016	701,795	1	,000	,661	,641	,68
	SitEM	-,210	,043	23,807	1	,000	,811	,745	,88
	StrabM	,173	,047	13,737	1	,000	1,189	1,085	1,30
Step 4	AI1º-1ª	-,417	,016	701,724	1	,000	,659	,639	,68
	SitEP	,081	,034	5,592	1	,018	1,084	1,014	1,15
	SitEM	-,240	,045	28,856	1	,000	,787	,721	,85
	StrabM	,187	,047	15,736	1	,000	1,205	1,099	1,32
Step 5	AI1º-1ª	-,421	,016	715,019	1	,000	,656	,636	,67
	SitEP	,087	,034	6,476	1	,011	1,090	1,020	1,16
	SitEM	-,233	,045	27,146	1	,000	,792	,726	,86
	StrabM	,186	,047	15,523	1	,000	1,204	1,098	1,32
	MPub_Priv	,525	,229	5,249	1	,022	1,690	1,079	2,64
Step 6	AI1º-1ª	-,424	,016	710,387	1	,000	,654	,634	,67
	SitEP	,091	,034	7,149	1	,008	1,095	1,025	1,17
	SitEM	-,239	,045	28,357	1	,000	,787	,721	,86
	StrabM	,185	,047	15,456	1	,000	1,203	1,097	1,32
	MovB	,150	,075	3,988	1	,046	1,162	1,003	1,34
	MPub_Priv	,525	,229	5,237	1	,022	1,690	1,078	2,65

(For Legend see Appendix 1)

CR-TM1 – ENTER

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)	95,0% CI for Exp(B)	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Curso	,001	,015	,006	1	,937	1,001	,973	1,031
Nat	,016	,009	3,525	1	,060	1,016	,999	1,034
Nac	,016	,021	,572	1	,449	1,016	,975	1,058
EstCivil	,030	,259	,013	1	,909	1,030	,620	1,712
SitE	-,024	,057	,182	1	,670	,976	,873	1,091
PaiFL	-,270	,199	1,855	1	,173	,763	,517	1,126
PaiInc.	,014	,594	,001	1	,981	1,014	,317	3,249
HLP	-,017	,023	,539	1	,463	,983	,940	1,029
SitEP	,020	,049	,165	1	,685	1,020	,927	1,123
StrabP	,039	,078	,249	1	,618	1,040	,892	1,212
Mãe_Fl	-,465	,413	1,267	1	,260	,628	,280	1,412
HLM	,031	,026	1,385	1	,239	1,031	,980	1,085
SitEM	,025	,066	,148	1	,701	1,026	,901	1,168
StrabM	,019	,075	,063	1	,802	1,019	,880	1,180
RepB	-,877	,962	,831	1	,362	,416	,063	2,743
NRepB	-,580	,640	,821	1	,365	,560	,160	1,963
MovB	,038	,114	,109	1	,741	1,038	,830	1,299
RepS	,226	,267	,718	1	,397	1,254	,743	2,117
NRepS	,085	,202	,177	1	,674	1,089	,733	1,616
MovS	-,200	,171	1,374	1	,241	,819	,586	1,144
MPub_Priv	,232	,326	,505	1	,477	1,260	,666	2,387
MPRiv_Pub	,022	,204	,011	1	,915	1,022	,686	1,523
PaísConclSec	-,025	,015	2,927	1	,087	,975	,947	1,004
NI	-,003	,067	,002	1	,965	,997	,874	1,137
AI1º-1ª	-,242	,029	68,924	1	,000	,785	,742	,831
Nota E1	-,010	,002	18,708	1	,000	,990	,985	,994

(For Legend see Appendix 1)

CR- TM1 – LR

Variables in the Equation

		B	SE	Wald	df	Sig.	Exp(B)	95,0% CI for Exp(B)	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Step 1	AI1º-1ª	-,207	,022	89,378	1	,000	,813	,779	,849
Step 2	AI1º-1ª	-,230	,022	106,373	1	,000	,794	,760	,830
	Nota E1	-,010	,002	19,127	1	,000	,990	,986	,995

(For Legend see Appendix 1)

CR- TM1 – LR

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)	95,0% CI for Exp(B)	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Curso	,002	,014	,031	1	,860	1,002	,975	1,030
Nat	-,009	,011	,778	1	,378	,991	,970	1,012
Nac	,021	,022	,904	1	,342	1,021	,978	1,065
EstCivil	,197	,251	,614	1	,433	1,218	,744	1,993
SitE	-,061	,057	1,150	1	,283	,941	,841	1,052
PaiFl	,277	,196	1,999	1	,157	1,319	,898	1,938
PaiInc	-,242	,600	,163	1	,687	,785	,242	2,543
HLP	-,023	,023	1,013	1	,314	,978	,935	1,022
SitEP	,060	,045	1,746	1	,186	1,062	,971	1,160
StrabP	-,026	,076	,115	1	,735	,974	,839	1,132
MãeFl	,186	,376	,244	1	,621	1,204	,576	2,515
HLM	,023	,026	,816	1	,366	1,024	,973	1,077
SitEM	-,046	,068	,464	1	,496	,955	,835	1,091
StrabM	,114	,075	2,327	1	,127	1,121	,968	1,298
RepB	1,034	,790	1,714	1	,190	2,812	,598	13,224
NRepB	,378	,537	,494	1	,482	1,459	,509	4,182
MovB	,062	,114	,297	1	,586	1,064	,851	1,330
RepS	,267	,250	1,137	1	,286	1,306	,800	2,132
NRepS	,205	,185	1,229	1	,268	1,228	,854	1,765
MovS	,159	,162	,965	1	,326	1,173	,853	1,612
MPub_Priv	-,034	,306	,012	1	,912	,967	,531	1,762
MPRiv_Pub	-,155	,196	,626	1	,429	,857	,584	1,257
PaísConclSec	,010	,016	,418	1	,518	1,010	,980	1,042
NI	,106	,059	3,203	1	,073	1,112	,990	1,248
AI1º-1ª	-,593	,033	323,594	1	,000	,553	,518	,590
Nota M1	-,012	,002	33,192	1	,000	,988	,984	,992

(For Legend see Appendix 1)

Survival Tables by Gender and Discipline (Gender Codes: 2-Female; 3-Male)

Survival Table (E1)

Time		Baseline Cum Hazard	At mean of covariates Survival		
			SE	Cum Hazard	Survival
Sexo= 2,00	1	.	,999	,001	,001
	2	.	,993	,003	,007
	3	.	,988	,004	,012
	4	.	,981	,005	,019
	5	.	,965	,007	,036
	6	.	,897	,012	,109
	7	.	,774	,017	,256
	8	.	,640	,021	,446
	9	.	,288	,017	1,246
	10	.	,000	.	.
Sexo= 3,00	1	.	,995	,002	,005
	2	.	,989	,003	,011
	3	.	,983	,004	,017
	4	.	,962	,006	,039
	5	.	,882	,011	,126
	6	.	,781	,015	,247
	7	.	,708	,017	,346
	8	.	,300	,014	1,205
	9	.	,000	.	.

Survival Table (M1)

Time		Baseline Cum Hazard	At mean of covariates Survival		
			SE	Cum Hazard	Survival
Sexo= 2,00	1		,993	,005	,0
	2		,985	,007	,0
	3		,973	,010	,0
	4		,953	,013	,0
	5		,904	,018	,1
	6		,781	,025	,2
	7		,512	,029	,6
	8		,117	,013	2,1
	9		,000	.	.
Sexo= 3,00	** 1		,997	,003	,0
	2		,992	,004	,0
	3		,981	,007	,0
	4		,976	,008	,0
	5		,936	,013	,0
	6		,870	,017	,1
	7		,756	,022	,2
	8		,607	,025	,5
	9		,143	,012	1,9

Survival Table (IG)

Time		Baseline Cum Hazard	At mean of covariates Survival		
			SE	Cum Hazard	Survival
Sexo= 2,00	1	.	,991	,004	,009
	2	.	,978	,006	,023
	3	.	,961	,009	,040
	4	.	,937	,012	,065
	5	.	,833	,019	,182
	6	.	,681	,028	,384
	7	.	,302	,026	1,197
	8	.	,004	,001	5,594
	9	.	,000	.	.
Sexo= 3,00	1	.	,999	,001	,001
	2	.	,996	,002	,004
	3	.	,979	,005	,021
	4	.	,961	,008	,040
	5	.	,903	,013	,102
	6	.	,801	,019	,222
	7	.	,646	,024	,437
	8	.	,416	,025	,876
	9	.	,014	,002	4,272
	10	.	,000	.	.

Appendix 4

Discriminant Analysis: Structure Matrix Coefficients (W-female; M-male)

	IG (W)	IG (M)	TM1 (W)	TM1 (M)	TE1 (W)	TE1 (M)
Curso	-0,037	-0,017	0,243	0,454	0,588	0,785
SitE	0,775	0,565	0,414	0,588	0,580	0,360
Nota M1	0,076	-0,193				
Nota E1	-0,456	-0,295	-0,353	-0,28		
Nota IG			-0,806	-0,051	-0,456	-0,220
NRS	0,241	0,64	0,104	-0,16	0,371	-0,092
NI	-0,091	0,158	0,314	0,336	0,321	0,311
HLM	-0,076	-0,052	0,128	-0,033	-0,076	0,314
HLP	-0,079	0,328	0,191	0,297	-0,197	0,402
EstCivil			-0,127	0,132	-0,109	0,012

(For Legend see Appendix 1)