Something changes, something not. Long-term trends in gender segregation of fields of study in Italy[1]

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Abstract: The aim of this article is to examine gender segregation among fields of study in Italian higher education and its change over time. Gender segregation has been analysed using micro-data on people who entered university in the 1900s (ILFI data) and data from recent cohorts of graduates (1995-2004) (ISTAT data. Relying on the work by van de Verfhorst and Kraykaamp (2001), I classified academic specialties into four fields: humanistic, economic, relational/communicative and technical/scientific. The degree of segregation across fields is estimated through a measure of absolute gender inequality (average partial effects) derived from multinomial logistic regression models. The pattern of segregation resembles those found by previous studies: men are more likely to enrol and graduate from fields which teach mainly technical/scientific skills, whereas women from cultural fields. It is visible a long-term trend of desegregation in the humanistic field, especially because women moved towards the relational and economic fields, in which the gender gap sharply declined. On the other hand, the technical/scientific field experienced fewer transformations and a substantial gender gap persists in recent cohorts.

Keywords: gender segregation, fields of study, higher education

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The expansion of women's participation in higher education

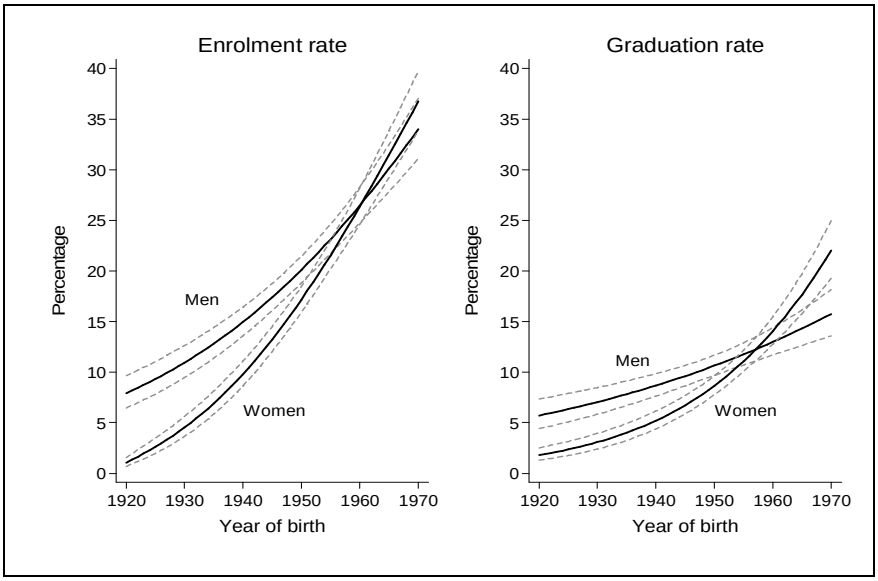
In the last century a massive expansion of higher education took place in all industrialized countries, so that in some OECD countries near 50% of the youth cohorts enter tertiary education. This expansion has concerned women in particular, who started at a disadvantage at the beginning of 20th century and reached access rates similar or higher than those of men at the end of the century. The UNESCO data show that in 1970 the rate of women's participation in tertiary education was rather diversified (it varied from 28% in Japan and the Netherlands to more than 45% in Poland and Finland) and it noticeably grew in the following decades, reaching and sometimes exceeding the threshold of 50% in most industrialized countries. The equality in overall access was reached in the 80s in Sweden, Norway, United States, Poland, Hungary and Portugal, while it was attained in the first half of the 90s in Australia, United Kingdom, Ireland, Greece, Spain, Denmark and Finland.

Also in Italy there was a considerable growth in women's participation in university education. The institutional data from Istat (1996) and MIUR (2006) show that the rate of women enrolled in university boosted from less than 15% in 1935 to 30% in 1945 to reach 50% in 1992. Data from the Italian Household Longitudinal Survey (figure 1) show that for people born between 1920 and 1970 the increase in the propensity to attend university and to graduate was approximately linear for men whereas exponential for women. Given that the quantitative gender parity has been achieved, it is interesting to understand whether the reduction of gender differences occurred also in the type of education. In fact, a lot of research evidence pointed out that gender inequality persists in several aspects of educational and occupational careers (Jacobs, 1995; 1996; Bradley, 2000; Charles and Bradley, 2002; Gerber and Schaefer, 2004). Although girls enrol in university more than boys, they usually attend less remunerative educational sectors, have lower chances of continuing their university career enrolling in PhD courses and, once in the labour market, they get lower wages than their male colleagues with the same education level (Gerber and Cheung, 2008).

In this paper I focus on the horizontal segregation in tertiary education in Italy and its changes over time. This topic is receiving growing attention by social researchers for equity and efficiency reasons. From the point of

view of equity, the study of horizontal gender differences in tertiary education allows us to better understand the gender segregation in the employment market. Besides, the limited access of women to some educational sectors – for example scientific faculties – is a problem of allocation inefficiency and of non-use of human capital[3], which is a key resource for the economic development of a society according to the economics of education.

Figure 1. Enrolment and graduation rates according to year of birth and gender. Italy, 1920-1970



Source: Triventi (2009).

This paper is organized as follows: in the next section I introduce some definitions and concepts which are useful for studying gender differences in tertiary education, I discuss some research results and hypotheses that

[3] This is clear if we consider that the latest data of the Pisa (Programme for International Student Assessment) survey on the learning of 15-year-old students, carried out by OECD, show that the males advantage in the results of maths and science tests has dwindled in time (OECD 2006).

explain gender segregation and its change over time. In the third section I present the objectives and the hypotheses, whereas in the fourth section I describe the data, the variables and the methods used in the analysis. The fifth section discusses the results and the last concludes.

Literature review

Definition of gender segregation in Higher Education

It is possible to study gender segregation considering two dimensions: the vertical and the horizontal (Charles and Bradley, 2002). The vertical segregation concerns the proportion of women in education levels within higher education. For example, in some countries there is a vertical distinction between non-university education, bachelor, master and PhD. On the contrary, for a long time the Italian system has not been vertically differentiated because universities provided only one type of long-degree course leading to the *laurea*[4]. A vertical differentiation has been introduced in 2001, with the reform of university system within the wider "Bologna process" that introduced a three-level structure of degree-courses (bachelor+master+doctorate). Since the vertical differentiation is very recent and data from Eurydice (2007) show that females are not underrepresented in the higher levels of tertiary education, this paper focuses on the second dimension of inequality, the horizontal segregation.

In those countries where educational qualifications have no legal value and there is a great differentiation in the educational offer, gender stratification is studied considering two aspects. The first concerns access to different kinds of education, e.g. in USA there is a distinction between private prestigious and selective universities, public selective universities, public non selective institutions, and community colleges. In Italy this distinction between types of institutions is less marked and has less consequences in the labour market. In fact in the Italian higher education

[4] *Diploma universitario*, a three-year certificate in technical fields, which was set up at the beginning of the 1990s, definitely had a lower number of students (see the introduction by Barone and Triventi in this number for more details). PhD courses were established in the first part of the 1980s but without a clear set of rules; hence the title was mainly viewed as a starting point for an academic career within university and it had a low market value (see the article by Ballarino and Colombo in this number for more details).

system all the institutions have the status of universities and the university qualifications have legal value, so all the graduates in a branch of study are considered to have the same competences apart from the institution where they got their degree. In Italy, it is the choice of the field of study that matters in several respects.

Fields of study constitute social as well as intellectual environments for students (Jacobs 1986) and they can affect several aspects of their process of cognitive and non-cognitive development (Astin 1977). Moreover, academic specialties have different regulations and organization systems (student-teacher ratio, compulsory attendance, number of annual examinations, for example) which are related to different failure rates, average marks, study progress and probabilities of dropping out (Triventi 2009). This segmentation between disciplines is probably higher in the Italian university system rather than in other countries because here the students have lower chances of freely choose their educational career. Most of the study programmes provides compulsory exams and only a limited number of credits can be obtained through exams freely chosen by the students. The horizontal stratification has an important role also after graduation, because fields of study lead to different occupational returns, both from a monetary (time to the get the first job, income, type of contract) and an immaterial point of view (prestige, power, flexibility and autonomy) (Ballarino, 2006; Ballarino and Bratti, 2009).

When talking about gender segregation the debate usually pays attention to the "scientific-humanistic gap". Within this discourse men have a higher propensity to enrol in a scientific field of study, whereas females are disproportionally overrepresented in humanistic subjects. Nevertheless, this statement undervalues that the magnitude of female participation is very widespread *within* these two sectors. Hence, it is possible to identify a second line of stratification: the distinction between technical fields of study and subjects with a relational and "care orientation" (Barone, 2008). My analysis tries to include both dimensions into account using a simplified and theoretically-oriented typology which divides the academic disciplines into four fields: economic, cultural, communicative-relational and technical-scientific. According to the work of van de Verfhorst and Kraaykamp (2001) each of this field gives students access to a different mix of resources and skills.

First of all, some academic disciplines teach primarily *economic skills*, emphasizing the value of financial wealth and consumption. Economics and Law are more focused on these topics because they teach students how to manage commercial and legal knowledge, to think in a logical way, to organize their work rationally, and to evaluate costs and benefits of different actions. A second kind of resources are *cultural skills*, which prevail in those sectors that pay attention to the abstract and philosophical way of thinking, to the study of history, art, literature, writing and reading, and that emphasize the importance of knowledge of criteria for judging and appreciating creativity. These characteristics prevail in Philosophy, Literature, and Arts. The third type of resources are *communicative-relational skills*. They encompass a wide spectrum of abilities: take care of people, talking in front of an audience, learning the main features of other cultures, interact with other people and be able to work collectively. The transmission of these skills is prevalent in the following courses: Communication, Sociology, Psychology, Social work, Education, and also Medicine. At last, *technical skills* include the ability of mathematical and formal reasoning, the knowledge of productive processes, technology and personal computer. These resources prevail in Natural sciences, Computer sciences, Architecture and Engineering.

The distinction among these four kinds of resources has key sociological implications because the access to a specific area of skills can affect several aspects of the occupational career (risk of unemployment, wage, job prestige), but also the type and level of cultural consumption, political orientation and participation in public and civil sphere (van de Verfhorst and Kraaykamp, 2001). Therefore it is interesting to investigate this theoretically-oriented classification in relation to gender segregation, in order to assess to what extent men and women have access to different kinds of resources and skills in higher education.

Which fields of study do females and males choose and why?

There is a large amount of research which demonstrated that men and women usually opt for different fields of study when they enrol in higher education. Moreover, these differences can be clearly seen also nowadays, notwithstanding the great expansion of women's participation in tertiary education. Bradley (2000) analysed institutional data from UNESCO and showed that worldwide women are more likely to graduate from Education,

Arts, Humanities, Social sciences and Law, while men are more likely to graduate from Natural sciences, Mathematics and Engineering. Barone (2008) found similar results analysing Reflex micro-data on people who graduated in 2000 in eight countries belonging to different European areas. The results of these two studies are rather similar, even if the authors analysed a different set of countries and used different data and methods. Furthermore, they highlight that the structure of gender horizontal segregation is pretty similar across countries.

Given this empirical evidence, social researchers tried to elaborate plausible explanation of gender segregation in higher education. Economists have elaborated a number of hypotheses using the rational choice theory. The *differential occupational returns in lifetime* hypothesis suggests that women tend to choose those fields of study that guarantee them higher returns in the first period of their career and with a relatively low income raise because by this way they can minimize the costs of a career interruption (Polashek, 1981). Even if plausible from a theoretical (economic) point of view, this explanation doesn't seem to be supported by available data (Jacobs, 1995; England et al., 2001). The *job-family conciliation* hypothesis states that girls tend to choose subjects that allow an access to jobs granting a better conciliation of work and family, for example, part-time, teaching and jobs in the public sector. Once again, research results don't support univocally this hypothesis, even though further and more detailed studies would be necessary. In particular, it is not clear whether 19 year-old girls, when choosing their field of study, consider their possible future family duties into account (Barone, 2008). The *comparative advantage hypothesis* instead focuses on the performance in different subjects in primary and secondary schools. According to this approach, girls prefer to enrol in fields of study in which they have got better relative results in order to minimize the risks of future educational failures.[5]

[5] Jonsson's (1999) analysis of data on Swedish high school students showed that boys and girls with analogous school results (similar marks in the same subjects) show considerable differences when choosing their field of study, and these differences reproduce the traditional gender-typical choices. On the whole this hypothesis seems account for the 10-30% of the choice of the field of study in Sweden, but it can't explain a large part of gender segregation.

Within the sociological and psychological perspective researchers have developed alternative explanations that consider cultural aspects and socialization processes (Mickelson, 1989). A first hypothesis refers to *gender-oriented values*. According to this perspective, when men choose their study sector they consider occupational returns as the most important feature, while women take into consideration a wider spectrum of aspects, as the "genuine" interest for the subject or the cultural/social value of an academic specialty. Hence, men often choose the most lucrative fields, whereas women opt for other subjects which they perceive as closer to their interests. There are few in depth studies on this topic and the results are not homogeneous[6]. In Italy data from a sample of upper secondary graduates in 2001 indicate that there are no relevant differences between males and females in the reasons for enrolling in tertiary education. In both groups about 18-19% affirmed they entered university to get a degree (credentialist vision) and 39% to get better chances to find a job (instrumental perspective). The intrinsic interest in the subject or in studying instead prevails among girls (42% opposed 38%) but the gender difference is modest (Triventi, 2009).

A second explanation suggests that most of the choices of the field of study at university are coherent with the traditional stereotypes about the "natural" abilities and preferences of boys and girls. These stereotypes are shared by large fractions of the population and they are daily reproduced through socialization within the family (Fennema and Sherman, 1977), but also through school and job assignments, mass-media, movies, etc (Astin and Myint, 1971; Sherman, 1980). Primary socialization is an especially powerful tool for this reproduction process. Little girls are taught to appreciate activities dealing with physical beauty, communication skills, relational abilities and cooperation. On the contrary, boys are presented a model based on strength, independence, the importance of practical activities and formal reasoning. During teen-ageing boys are more likely to be into activities dealing with engines, cars, computer and sports, while girls are likely to start voluntary activities or to have a higher bent for reading. The focus on different traits during primary and secondary

[6] In the USA a study seems to support this hypothesis only partially, because it showed that boys and girls give the same value to "external" returns as income, prestige and security, associated with their occupational preferences, but girls attach more importance to "intrinsic" and social returns and they are more inclined to altruism (Marini et al., 1996).

socialization contributes to consider the different choices as "natural". According to the social control perspective the socialization processes don't have such a pervasive power, while a key role is played by the social rewards and sanctions from family members, teachers and the peer group teenagers have necessarily to deal with when they have to make choices regarding their educational and occupational future (Jacobs, 1995).

At the end, some researchers explain the enrolment in scientific faculties referring to the different levels of math skills according to gender and consider a part of these differences as a result of biological and genetic factors. The main studies trace a part of gender differences in the cognitive computing skills and in the elaboration of spatial information skills back to three aspects: genes (Geary, 1998), brain functioning (Baron-Cohen, 2003) and hormones (Kimura, 1999). The most developed research are those focusing on the lateralization of human brain. The carrying out of cognitive operations processing spatial information takes place in both cerebral hemispheres in females and only in one in males. It is plausible that the hemisphere specialization is a better way of carrying out mathematical-spatial operations, but this higher efficiency, at the basis of the male advantage, has not been proved with convincing tests yet.

How did gender segregation change over time?

Researchers are also interested in establishing to what extent the level of gender segregation changed over time. Looking at the literature on this topic it is possible to find contrasting predictions. Functionalist, modernization and neo-institutional theories predict – albeit for heterogeneous reasons – a decline in the association between gender and field of study, while Marxist, feminist, and social stratification theories predict the persistence of gender segregation. The first theories, looking at broad societal changes in different domains, state that modernization and societal development, through urbanization and industrialization, have an important transformative effect on traditional arrangements and social practices. Moreover, modernization goes together with the rise of new psychological orientations in the population, which in turn promote new ways of thinking and related social attitudes. Societal development also fosters individualization, universalism and the importance of achieved skills against collective belongings, particularism and the role of ascribed characteristics in individual life courses. In this view, women became

progressively freer from their social belongings; they can abandon their traditional family roles pursuing their aspirations. Hence, these theories expect not only an expansion of women's participation in tertiary education, but also a growth of their enrolment in science, engineering and in those fields where they were traditionally under-represented.

On the opposite side, theories of conflict, Marxist and feminist theories point out that egalitarian gains in one domain are usually accompanied by new forms of stratification in other areas. The "conquests" obtained in one domain does not necessarily have a spill-over effect on women's outcomes in others. This is especially true in those areas associated with higher material and symbolic returns, such the technical and scientific fields of study within higher education. Moreover, according to these theories the traditional forms of socialization, social control and discrimination are still in place, even if with more subtle ways of functioning.

Assuming that cultural and social frameworks have a prominent role in the choice of field of study (more than simply economic considerations), these theories expect only minor changes in the overall degree of gender segregation across fields of study and small variations of females' presence in traditional male-dominated areas, like engineering and science. Charles and Bradley (2002) elaborated a more specific explanation, suggesting that the persistence of gender segregation is not necessarily incompatible with mandates for gender equality, because it can be reconciled with the "equal but separate" cultural principle, which is at the basis of some feminists' visions of improved women's status.

Looking at research results, we see that many studies found a reduction of horizontal gender segregation in higher education, but in most cases this decline is quite small. Lyson (1981) analysed data from the U.S. Office of Education on students who received a bachelor between 1966 and 1976, showing that seven of nine traditional male curricula experienced net increases of women, along with seven of ten sex-neutral subjects and two of four female subjects. Overall, the net increase of women in traditional male areas was greater than the variation in the other two areas. Watts (1997) analysed changes in gender segregation of course completion across fields of study in Australia over the period 1978-1994 using measures similar to those employed in the occupational segregation literature. He found a decrease of the association between gender and field of study until 1986, but steadiness after this year, even if women continued to increase

their share of graduates over time. Andres and Adamuti-Trache (2007) examined data from Statistics Canada from 1979 to 2004 using field-specific indices of association that measure the under- or overrepresentation of women in a particular field relative to the overall gender composition. The results suggest that even if we observe a convergence of participation in some fields, the main pattern is stability, because in 25 years gender segregation declined by only 5% in enrolments and by 13% in graduations.

Looking at comparative studies, Charles and Bradley (2002) analysed data from 12 countries using data from the ISSP (International Social Survey Programme) and they showed that the horizontal gender stratification is more persistent than the vertical one. Barone (2008) analysed data from the European Labour Force Survey for three cohorts of graduates (1965-74; 1975-84; 1985-94) in four European countries (Italy, Germany, the Netherlands, Norway). Using log-linear models he found a small decrease in the relative association between gender and field of study of graduation in the first period and stability in the second one. This result is in line with previous research which found a remarkable slowdown of desegregation trends in the 80s and 90s (Jacob 1995). Bradley (2000) analysed data from the UNESCO Statistical Yearbook on more than 30 countries across the world. Their indexes of dissimilarity and association changed a little over time; they fell down between 1970 and 1975, but stayed stable in the 80s. On the contrary, Ramirez and Wotipka (2001) studied sex segregation in higher education focusing on changes between 1972 and 1992 in the proportion of women enrolled in technical and scientific fields in 67 countries across the world. They found that women's underrepresentation slowly but constantly declined, especially in industrialized countries. This trend is related to both raise in women's level of participation in non-science and non-engineering fields and with the expansion of males' enrolment in science and engineering. The authors pointed out that these cross-national findings question the thesis of persistent inequality of women's enrolment in higher education.

Objectives and hypotheses

As we have seen in the previous section, common explanations of gender segregation suggest several processes which could explain why

males and females usually choose different fields of study in higher education. However, the lack of surveys with specific information on this topic doesn't allow to properly test these hypotheses. To address these issues we should have prospective panel data with information on educational preferences, marks in specific subjects, parents' orientations, extra-scholastic activities and characteristics of the peer group, only to mention the most relevant ones. At the moment in Italy a national survey with this kind of information is not available and therefore the objectives of the empirical analysis are more modest. The research questions are as follows.

1) What is the association between gender and field of study? In which fields do women have higher probability to enrol?
2) To what extent did the subject-related choices change in the second part of the 20th century and in recent years?

In the first part I examine the association between gender and field of study for people who entered in higher education in three different periods in the 1900s. In the second part I analyse trends of more recent cohorts of graduates in the 1990s and 2000s. Given the theoretical and empirical literature cited in the previous section, it is possible to elaborate some hypotheses on the expected trends. First of all, given the pattern of stratification found by previous studies, I expect that men have a higher propensity to enrol in those fields which transmit technical and scientific skills, while women are more likely to enrol and graduate in cultural subjects. I also expect a higher propensity for men to enrol in economic fields and women in relational/communicative fields, but the differences should be less marked in those areas than in the previous ones. Secondly, given the heterogeneity of research results it is not easy to predict trends over time; nonetheless, many studies found a modest decline over time of gender segregation and it is possible that the same trend is observable in Italy. We could expect a reduction especially in the economic and relational fields, where a convergence of enrolment and graduation seems to have occurred if we look at institutional data. We also expect a substantial advantage of males in access to technical and scientific field with only a minor reduction over time, given by the increase of women's participation in some scientific disciplines like biology and geology.

Data, variables and methods

Data

To answer the research questions I draw on two sources of data. To examine the long-term trends I use the Italian Household Longitudinal Survey (*Indagine Longitudinale sulle Famiglie Italiane* – ILFI, hereafter) and to study recent changes I use the Italian University Graduates Survey (*Indagine sull'inserimento professionale dei laureati* – IUGS, hereafter). ILFI is a longitudinal and prospective panel survey carried out for the first time in 1997 and repeated four times every two years. In the first wave, respondents were asked to provide retrospective information on educational and occupational careers. In the successive waves, information about those same respondents was updated, and retrospective data collected from first-time interviewees who entered the sample after the first wave. The ILFI was conducted on a representative sample of Italian men and women aged 18 or over and residing in Italy at the time of the interview[7]. In the present analysis I use the first three waves, conducted in 1997, 1999 and 2001; people who enter higher education correspond to around 2,300 cases.

The IUGS is a survey conducted every three years by the Italian National Statistical Institute; it collects information on school and work careers of university graduates, which are interviewed three years after their graduation. In the analysis I use four cross-sectional waves, conducted in 1998, 2001, 2004 and 2007 providing information on graduates who obtained their degree respectively in 1995, 1998, 2001, and 2004. The cross-sectional waves of the IUGS have a sample ranging from 17,000 to 26,000 cases[8].

Variables

The main dependent variable is the *field of study typology* which has four categories: cultural, economic, relational and technical. The cultural field includes humanities (Literature and Arts), Philosophy, and Foreign languages; the economic field includes Economics, Law, Statistics, Agriculture. The relational/communicative field comprises Political

[7] A detailed description of the sampling procedure can be found in Bernardi and Pisati (2002); in English you can refer to Pisati and Schizzerotto (2004).

[8] A detailed description of the sampling procedure can be found in the Istat's manuals. In English you can refer to Ballarino and Bratti (2009).

science, Sociology, Education, Psychology and Medicine, whereas the technical-scientific field includes Mathematics, Physics and other Natural sciences (e.g. Biology, Chemistry, Geology), Computer science, Architecture and Engineering. It is important to point out that the field of study typology is built in the same way using both the ILFI and the IUGS data, but the two variables refer to distinct aspects of the gender segregation process.

When using the ILFI data I analyse the *field of study of enrolment*, the discipline upper secondary graduates decide to enter, independent of the fact if they were able to successfully complete their course. The dependent variable in the IUGS instead is the *field of study of graduation* and therefore it could be the results of two selection processes: the decision to enrol in a particular course and the ability to successfully complete it. If the probability of drop-out in different programmes is not affected by gender, hence the results of the two indicators are similar, but if this is not the case the two indicators could give different findings. I argue that the first variable is more appropriate if we are interested in examining the decision process, whereas the second one is more adequate if we are interested in the consequences of the type of degree for future occupational careers[9].

The main independent variable is *gender* and the "basic controls" variables are parents' education and occupational status[10], and geographical

[9] In ILFI both variables on enrolment and graduation are available, but the number of cases on the second one is too small due to the high drop-out rates in Italian higher education. Therefore, a detailed analysis is not useful because the uncertainty around the estimates is very large. However, exploratory analyses suggest not dramatic differences in the results obtained using the two indicators. In the IUGS data instead only the variable on the field of study of graduation is available. Unfortunately and surprisingly, the Italian survey on upper secondary graduates does not provide a variable on the first field of study of enrolment for all the students who entered university.

[10] Using ILFI data occupational class is measured with the highest occupational status between the father and the mother when the respondent was 14 years old; the scale is the de Lillo and Schizzerotto prestige scale, which adapts the Goldthorpe' scale to the Italian context (see Zella's article in this number of IJSE for a detailed description). Parents' education is measured by a continuous variable which quantifies the years of education attended by the parent who has the highest educational attainment. Using IUGS data parents' education is a categorical variable constructed by the same dominance criterion and it classified respondents in four groups: those with parents' who have no more than the primary, lower secondary, upper secondary, and tertiary level of education. Social class of origin is a categorical variable which classifies respondents in four categories: bourgeoisie, white collars, petit bourgeoisie, and working class.

area. "Additional controls" (mediators) are the type of high school diploma and the final mark at upper secondary school. In ILFI also failure of one or more year and interruption at the high school are available and included as controls[11].

Using the ILFI data I consider people who entered university between 1945 and 2000, classifying them into three cohorts of matriculation: 1945-1968, 1969-1985, and 1986-2000. The first cohort entered university before the reform of 1969, which allowed all high school leavers with a 5-year qualification to enrol in higher education irrespective of the type of diploma they received. The second cohort attended university in the post-reform period with programme overcrowding and a growth of drop-outs and delayed graduations (Triventi and Trivellato, 2008; 2009). The third cohort entered university in a period with some modifications in the architecture of degree courses, educational welfare and autonomy of universities. Using the IUGS data I analyse four cohorts of university graduates who received their degree in 1995, 1998, 2001 and 2004. Since graduates with a three-year bachelor are present only in the last survey and they are a minority I excluded them from the sample. Hence, all the analyses are only focused on pre-reform graduates, those who attended a 4/5-year course (6 years for Medicine).

Methods

In the analysis I use multinomial logistic regression models to estimate the partial association between gender and field of study, because the dependent variable is categorical (not strictly ordered) (Long 1997). I estimated two series of models. The first models analyse the probability of *enrolling* in different fields of study and are estimated on individuals in ILFI who entered university between 1945 and 2000. The second series of models analyse the likelihood of *graduating* from different fields of study among students who graduated between 1995 and 2004 in IUGS data. I estimated two different specifications for each kind of model: in the first one only gender, cohort, and basic control variables (socio-demographic) are included, while in the second ones additional controls are added (school career).

[11] Control variables in ILFI and IUGS partially differ in their number, type (metric or categorical) and in their categories. See the tables in the Appendix for descriptive statistics.

Social researchers usually report *logit* coefficients or odds ratios and their level of statistical significance to present the results of their logistic regression models. Even though this is a well-established tradition in sociological research, there are statistical shortcomings in comparing *logit* coefficients or odds ratios between different groups (see, for example, Allison, 1999; Mood, 2009). Since in my analysis I compare different cohorts of people and graduates in different surveys, I estimate Average Partial Effects (APE), which allow comparability across groups, are well suited for independent categorical variables and have an easy interpretation because they can be read as average differences in the probability of interest between categories[12]. It is important to bear in mind that APE measure absolute inequality instead of relative inequality. They work on the predicted probabilities and – differently from odds-ratios – they include in the calculations the "marginals", because they consider changes in the distribution of the fields of study over time. Elsewhere I argued that this is a better choice if the process of expansion is not controlled by the state and the number of slots in higher education is not externally fixed, but it is a function of individuals' decisions (Triventi, 2010). Since in Italy the majority of the disciplines does not have this kind of restriction at entrance[13], APE can be considered an appropriate measure to capture variations over time of inequality. The analysis on the IUGS employs sampling weights provided by the National Institute of Statistics, whereas ILFI does not need the use of sample weights.

Results

Long-term trends

In this section long-term trends of gender segregation are examined. As a first step, I show descriptive statistics on changes of participation in different fields of study in the whole population and according to gender. Table 1 indicates that in the three cohorts of freshmen between 1945 and 2000 the four fields of study followed different trends. The technical field captures about one quarter of new entrants and it doesn't show much

[12] See Long (1997) for a presentation of the average partial effects and related measures. See Bartus (2005; 2008) for a description of the particular method used in my analysis.
[13] Medicine and Architecture are exceptions, as in most of European countries.

change, whereas the relational field expanded from 13% in the first cohort to 22% in the third one. On the contrary, the enrolment rate in the cultural areas declined from 26% to 21% while the economic field experienced a U-shaped change, with a decline from the first to the second cohort and again an increase among individuals who entered university between 1985 and 2000.

Table 2 presents the same trends distinguishing by gender. Among individuals who enrolled in university before the 1969 reform the presence of women was very high in the cultural area (54% vs 9%), whereas the economic (45% vs 21%) and technical fields (29% vs 19%) were chosen more frequently by men. Looking at trends over time, we observe that the proportion of females who enrolled in the cultural field declined from 54% to 30%, while it grew a lot in the economic and relational fields, with an increase from the first to the third cohort of respectively 12 and 17 percentage points. Among men we observe general stability of enrolment in the cultural and relational field, while an increase in the technical field from 29% to 37% and a decline in the economic one from 45% to 36%.

Table 1. Percentage of individuals enrolled in different fields of study according to gender and cohort of matriculation at university, Italy, 1945-2000.

	Cultural	Economic	Relational	Technical	Total	N.
1945-1968	26.2	35.5	13.1	25.2	100.0	313
1969-1985	24.6	24.9	23.3	27.2	100.0	727
1986-2000	20.6	33.5	21.9	24.0	100.0	962
Total	22.9	30.7	21.0	25.4	100.0	2,002

Source: author's estimates on ILFI data (1997; 1999; 2001).

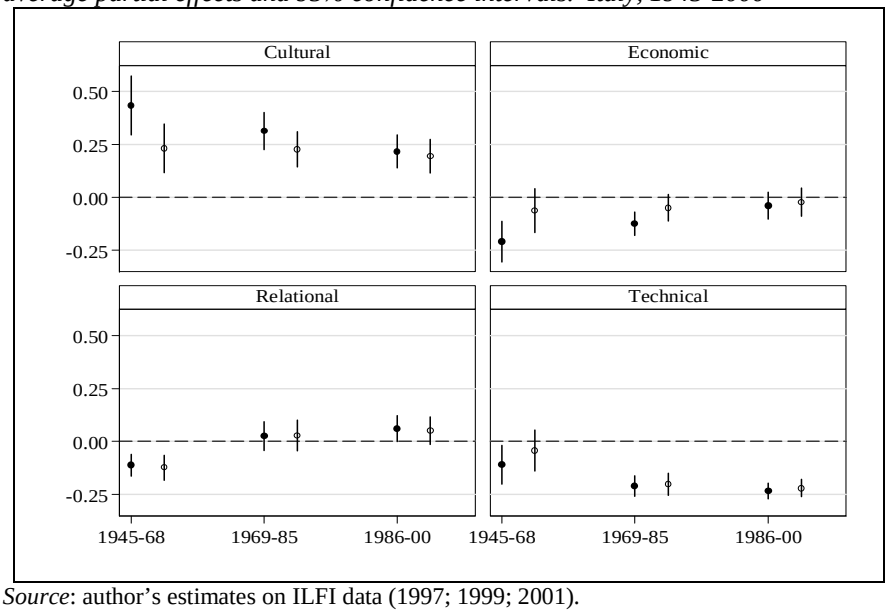
Table 2. Percentage of individuals enrolled in different fields of study according to gender and cohort of matriculation at university, Italy, 1945-2000.

	1945-68		1969-85		1986-00	
	Male	Female	Male	Female	Male	Female
Cultural	8.9	53.7	10.1	42.3	7.9	30.3
Economic	44.8	20.7	30.7	17.9	35.7	31.8
Relational	17.2	6.6	22.4	24.3	18.9	24.1
Technical	29.2	19.0	36.9	15.5	37.4	13.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
N.	204	130	420	372	465	633

Source: author's estimates on ILFI data (1997; 1999; 2001).

After the descriptive statistics, we focus the attention on the multivariate analysis. Figure 2 presents in a visual form the partial association between gender and enrolment in different fields of study, which are represented in four separate panels. The graphics show on the x-axis the cohort of the first matriculation at university and on the y-axis the magnitude of the gender differences in the probability of choosing each field of study. The horizontal dashed line indicates the points where gender differences are null (zero). Gender disparities are quantified with average partial effects (the dots) and uncertainty around the estimates is presented as well plotting 95% confidence intervals (the lines).

Figure 2. Partial association between gender and probability of enrolling in four broad fields of study according to the cohort of matriculation at university: average partial effects and 95% confidence intervals. Italy, 1945-2000



Source: author's estimates on ILFI data (1997; 1999; 2001).
Note*:* full dots=estimates with basic controls; hollow cycles=estimates with basic and additional controls

For each cohort two estimates are reported which corresponds to two different model specifications. The first ones (full dots) represent the gender differences estimated including only the basic controls (socio-demographic variables); I will refer to these estimates as the "total gender effect". The second ones (hollow cycles) represent the gender differences estimated including the basic and the additional controls (previous educational career). I refer to them as the "residual gender effect" because they represent differences in the probability of choosing a given field of study if males and females had the same socio-demographic characteristics, educational experiences and scholastic performances.

The results show that a general long-term decline in the association between gender and the choice of broad field of study occurred in Italy, even if this reduction is far from homogenous in the four subject areas. The total gender effect on the probability of choosing a cultural field was really high among the first cohort (more than 50 percentage points) and it declined in the following periods. Nevertheless the sex difference didn't disappear and it is around 20 percentage points among individuals who entered tertiary education between 1985 and 2000. In the first cohort females had lower probabilities of entering an economic (20 percentage points) and a relational (15 percentage points) field, but these differences progressively disappeared in the second and third period.

Moreover, in the youngest cohort females seem to have a slightly higher probability of entering a relational field of study. Even if the uncertainty around the estimates suggests caution in the interpretation of this result (because the confidence interval overlaps to the zero line), it is plausible because institutional data show that female are now overrepresented in Sociology, Psychology, Education and also in Medicine, just the academic disciplines included in the relational field. Female have less probability than males to choose a technical and scientific field of study and this difference is around 20 percentage points, also in the younger cohorts who entered the university system just before the implementation of the "Bologna process".

The gender gap didn't show a sensible decline, because a slight increase seems to be occurred between the first and second cohort, while we observe stability since the 70s. Obviously the broad categorization used here masks the increase of female participation signalled by institutional data in some academic disciplines, as architecture, geology and biology, but the strong

differences in engineering and computer science contribute to maintain the low feminization in this area. At the end, it is interesting to point out that even if we control for the previous school career the gender gap is only partially reduced; this is an indirect sign that the differences between males and females in the choice of the field of study are determined to a large extent by variables which are not related to the previous achievement and school career. Also the trends over time are the same if we look at the "residual gender effect" rather than the "total gender effect".

Recent trends

Using the IUGS data I now examine four recent cohorts of graduates; since the time-span is only ten years I expect less change in the distribution of fields over time. If we look at graduates in 1995 and in 2004 (table 3), we detect a slight increase of the cultural and relational field, and a small contraction of the economic and technical/scientific fields. Table 4 presents the same trends according to gender. First of all, the sex segregation is marked and similar to that observed for enrolment: in 2004 less than 10% of men and more than 30% of women graduated from a humanistic field; on the contrary 40% of men and less than 20% of women received a degree in technical or scientific subjects.

Table 3. Percentage of individuals enrolled in different fields of study according to the cohort of graduation at university, Italy, 1995-2004.

	Cultural	Economic	Relational	Technical	Total	N
1995	18.8	35.0	16.4	29.8	100.0	16,585
1998	19.1	34.3	15.7	30.9	100.0	20,539
2001	19.6	35.5	17.4	27.5	100.0	21,927
2004	22.5	31.3	18.3	27.9	100.0	26,160
Total	20.2	33.9	17.1	28.8	100.0	85,211

Source: author's estimates on IUGS data (1998; 2001; 2004; 2007).

As hypothesized, gender differences are less marked in the other two academic areas: men are slightly overrepresented in the economic disciplines (36% vs 29%), whereas women are more present in the relational/communicative field (20% vs 16%). Looking at recent trends, the quota of females in cultural and technical/scientific fields is stable, while it

increased in relational/communicative faculties and slightly declined in the economic ones. Men tripled their graduation rate in the humanistic fields (from 3% to near 9%), but they reduced their relative presence in the economic field (from 42% to 36%) and stayed stable in the other two areas.

The results from the multinomial logistic regression models (figure 3) show a pattern rather similar to that observed for the long-term trends, adding new evidence for the recent cohorts. First, the long-term decline of women's over-representation in cultural disciplines continued in the transition between the two centuries, even if it is not huge in absolute terms. Among graduates of 1995 women were 28 points more likely than men to graduate from a cultural field, whereas in 2004 the average gender difference was around 22 points. In 1995 women had also lower chances to graduate from an economic field (10 points) but this gap slightly reduced over time (it is around 6 percentage points in 2004).

Table 4. Percentage of individuals enrolled in different fields of study according to gender and cohort of graduation at university, Italy, 1995-2004.

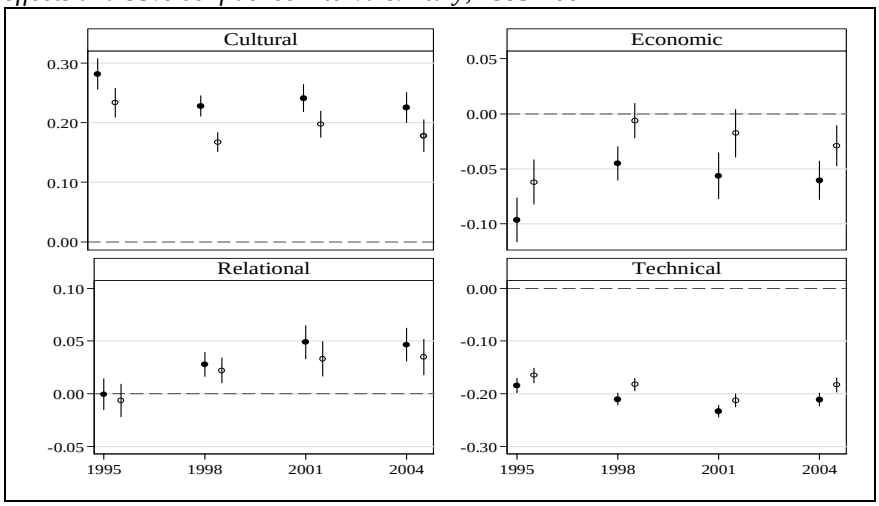
	1995		1998		2001		2004	
	Female	Male	Female	Male	Female	Male	Female	Male
Cultural	31.9	3.3	29.1	6.0	29.7	5.4	31.6	8.6
Economic	33.5	42.3	32.5	37.1	33.6	39.5	29.3	35.6
Relational	15.5	15.6	17.0	14.3	19.8	14.9	20.4	15.9
Technical	19.0	38.8	21.4	42.6	16.9	40.2	18.7	39.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N	7,717	5,959	11,005	9,125	11,084	9,936	13,503	11,917

Source: author's estimates on IUGS data (1998; 2001; 2004; 2007).

In the previous section we observed a long-term desegregation in the relational field. Data on recent cohorts suggests this trend continued: in fact, in 1995 there were no gender differences, but in 2004 women were more likely than men to graduate in this field (5 points of differences). If we look at the technical/scientific fields we see partially similar results comparing the trends in the 1900s and in more recent cohorts, because both don't indicate a clear trend toward a reduction of inequality. From 1995 to 2001 the gender difference slightly raised from 18 to 23 points, whereas it reduced a little among 2004 graduates. We need further data and more recent cohorts to understand if new graduates experienced a further reduction of the gender differences or not. At the moment we can

reasonably state that gender stratification in hard sciences is still in place and highly persistent.

Figure 3. Partial association between gender and probability of graduating from four broad fields of study according to the year of graduation: average partial effects and 95% confidence intervals. Italy, 1995-2004



Conclusions

The aim of this article was to examine gender segregation in Italian higher education and its change over time. Previous research on this topic in comparative perspective showed the existence of clear patterns of differentiation in the choice of the field of study between males and females, with only minor changes over time. In this paper gender segregation has been analysed using micro-data on people who entered university in the 1900s and data from recent cohorts of graduates (1995-2004). I employed a theoretically-driven typology of academic specialties on the basis of the type of resources that they mainly transmit to students. Relying on the work by van de Verfhorst and Kraykaamp (2001), I classified academic specialties into four fields: humanistic, economic,

relational/communicative and technical/scientific. The degree of segregation across fields was estimated through a measure of absolute gender inequality (average partial effects) derived from multinomial logistic regression models, which control for potential confounding variables.

As expected, the pattern of segregation resembles those found by previous studies: men are more likely to enrol and graduate from fields which transmit mainly technical/scientific skills, whereas women from cultural fields. This difference is apparent also nowadays, but some changes over time occurred: in fact, it is visible a long-term trend of desegregation in the humanistic field, especially because women progressively have been moving towards other areas. On the other hand, the technical/scientific field experienced fewer transformations and a substantial gender gap persisted in the 2004 cohort of graduates.

Gender stratification in the other two fields of study is less marked and experienced a change of sign in the second part of the 1900s. In the cohort who entered university before the reform of 1969 men had a higher probability of enrolling in a relational/communicative field, in the cohort of matriculation 1969-85 the difference disappeared and in the recent cohort women are instead more likely to enrol in this field. This overturn is mainly due to the growth of females' participation in those disciplines such as Psychology, Communicative sciences, Sociology and also Medicine. A reduction of segregation is also visible in the economic area, even if in recent cohorts of graduates men still have faintly higher probabilities to graduate from this field.

To sum, it seems that in the XX century and in more recent cohorts of graduates some changes in gender stratification occurred. Italy was in a very unequal condition at the beginning of the past century. It was one of the industrialized countries with higher gender disparities in higher education, but also in the labour market and in other social spheres. This study showed that in the long run a process of desegregation in some academic areas occurred, especially in the cultural and relational fields. This is mainly due to changes in the overall distribution of the fields of study, with an expansion of the relational/communicative disciplines and a contraction of the classical humanistic disciplines (Philosophy, Literature, Arts). Women seem to be moved partially from the cultural field to the

relational and the economic ones, but less frequently towards technical and scientific subjects, which are still now colonized by a large portion of men.

Obviously, the simplified typology used in this work doesn't allow investigating in detail the gender segregation at the level of faculty or degree course, but it gives the sense of both change and persistence occurred in the Italian context. A more detailed analysis probably would show that also within the broad technical/scientific field there are large differences in gender participation, with women less underrepresented in Architecture than in Engineering, in Biology than in Physics, in Mathematics rather than in Computer sciences. Also within the same discipline, like Engineering, it is likely to find more women in the "softer" subjects like organizational or environmental engineering rather than in the "harder" ones, like mechanic, industrial or physics engineering.

This recent pattern could have both positive and negative effects. From one side, it is a way women can enter a field which they perceived in the past as far from their interests and competencies; this, in turn, could facilitate access to more and more women in these technical areas, contributing to a reduction of the gender gap. On the other side, this process could represent simply a partial and selective entrance, with a reproduction of sex segregation within the scientific area. We need a detailed scrutiny of new bachelor and master graduates in order to better understand this phenomenon. A qualitative judgement of the extent of change and its implication for women's broad condition instead is highly dependent on which are policy makers' main goals.

It is not the purpose of this paper to discuss how to deal with women's underrepresentation through policy interventions. Only to mention a general idea, given the literature and previous research results, the choice of field of study seems not to be linked merely to economic considerations, but is deeply rooted in socialization and cultural processes connected to individual identities. These processes start at the beginning of each individual's life; in this respect it is clear that tertiary education institutions could only have a minor role. Ideally, professors should educate future mothers and fathers not to reproduce gender stereotypes with their children, deconstructing the rigid division of gender roles. On the other hand, one of the policy areas in which universities could play a direct role is counselling. It is important that universities and faculties do a professional and gender-neutral work in promoting their study programmes among high school

leavers, in order to mitigate the stereotypes about which subjects are well suited for girls and which for boys.

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Appendix

Table A1. Descriptive statistics on ILFI data according to cohort of matriculation at university: % or mean of independent variables.

	1945/1968	1969/1985	1986/2000	Total
Gender				
Male	59.2	52.3	42.2	48.4
Female	40.8	47.7	57.8	51.6
Total	100.0	100.0	100.0	100.0
Area				
North-West	21.7	23.2	26.8	24.7
North-East / Center	25.7	26.7	25.6	26.0
South / Islands	52.6	50.1	47.6	49.3
Total	100.0	100.0	100.0	100.0
Parents' education (scale: 0-20)	9.4	9.0	10.5	9.8
Parents' occupation (scale: 9.97-90.20)	50.2	44.8	47.5	46.9
Type of upper secondary qualification				
Classic	37.4	18.4	15.4	19.8
Scientific	12.0	29.0	30.7	27.2
Other lyceum	22.0	18.5	14.5	17.1
Tech./Prof.	28.6	34.1	39.5	35.9
Total	100.0	100.0	100.0	100.0
High school failure				
Not	14.3	16.0	13.4	14.5
Yes	85.7	84.0	86.6	85.5
Total	100.0	100.0	100.0	100.0
High school delay				
Not	96.0	96.1	97.8	96.9
Yes	4.0	3.9	2.2	3.1
Total	100.0	100.0	100.0	100.0
High school mark (scale: 6-10)	7.4	7.6	7.9	7.7
N.	349	816	1,118	2,283

Source: author's estimates on ILFI (1997; 1999; 2001).

Table A2. Descriptive statistics on IUGS data according to cohort of graduation: % or mean of independent variables.

	1995	1998	2001	2004	Total
Gender					
Male	45.2	44.5	42.5	40.5	42.8
Female	54.8	55.5	57.5	59.5	57.2
Total	100.0	100.0	100.0	100.0	100.0
Area					
North-West	27.4	26.4	25.2	23.2	25.3
North-East	19.5	21.5	21.0	19.4	20.3
Center	24.0	24.9	25.0	24.3	24.6
South	18.9	18.6	19.7	22.5	20.1
Islands	10.2	8.7	9.2	10.7	9.7
Total	100.0	100.0	100.0	100.0	100.0
Parents' education					
Primary	18.8	13.9	11.8	9.0	12.7
Lower secondary	20.2	23.3	23.1	21.6	22.2
Upper secondary	33.9	35.8	37.6	40.4	37.3
Teriary	27.2	27.0	27.5	29.0	27.8
Total	100.0	100.0	100.0	100.0	100.0
Social class					
Bourgeosie	29.3	26.2	25.5	23.6	25.8
White collars	34.6	34.1	35.0	38.7	35.8
Petit bourgeoisie	19.1	16.4	15.4	13.4	15.7
Working class	17.0	23.3	24.1	24.3	22.6
Total	100.0	100.0	100.0	100.0	100.0
Type of upper secondary qualification					
Scientific	37.3	37.2	37.2	40.5	38.2
Classic	23.0	20.4	19.7	20.0	20.6
Other Lyceum	12.1	12.1	11.8	12.7	12.2
Tech/Prof	27.7	30.3	31.3	26.7	29.0
Total	100.0	100.0	100.0	100.0	100.0
High school mark (scale: 36-60)	48.4	48.9	49.0	49.3	49.0
N	17,106	20,539	21,927	26,160	85,732

Source: author's estimates on IUGS data (1998; 2001; 2004; 2007).

Table A3. Multinomial logistic regression predicting the probability of entering four fields of study (only basic controls): average partial effects, standard errors and statistical significance.

	Cultural			Economic			Communicative			Technical		
	1945–1968	1969–1985	1986–2000	1945–1969	1970–1985	1986–2000	1945–1969	1970–1985	1986–2000	1945-69	1970-85	1986-2000
female	0.434***	0.313***	0.216***	–0.210***	–0.125***	–0.039	–0.113***	0.024	0.059	-0.111*	-0.211***	-0.236***
	(0.071)	(0.045)	(0.040)	(0.049)	(0.028)	(0.033)	(0.026)	(0.035)	(0.032)	(0.047)	(0.025)	(0.019)
area_2	–0.057	–0.011	–0.025	0.028	–0.029	–0.028	0.066	0.007	0.020	-0.038	0.033	0.033
	(0.057)	(0.042)	(0.033)	(0.089)	(0.045)	(0.044)	(0.079)	(0.047)	(0.040)	(0.070)	(0.050)	(0.040)
area_3	–0.109*	–0.046	–0.033	0.118	0.012	0.062	0.032	–0.006	–0.016	-0.042	0.040	-0.013
	(0.053)	(0.036)	(0.029)	(0.081)	(0.042)	(0.040)	(0.063)	(0.040)	(0.033)	(0.064)	(0.044)	(0.033)
educfam	0.001	–0.003	–0.006	–0.008	0.003	–0.006	0.005	–0.003	–0.001	0.002	0.003	0.013**
	(0.006)	(0.005)	(0.004)	(0.007)	(0.005)	(0.005)	(0.006)	(0.005)	(0.004)	(0.007)	(0.005)	(0.004)
occfam	–0.003*	–0.001	0.001	0.002	–0.001	0.001	0.000	0.000	0.001	0.001	0.002	-0.003***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Observations	282	675	888	282	675	888	282	675	888	282	675	888
Log likelihood	–335.572	–875.665	–1146.032	–335.572	–875.665	–1146.032	–335.572	–875.665	–1146.032	-335.572	-875.665	-1146.032

Source: author's estimates on ILFI (1997; 1999; 2001).

Note: Standard errors in parentheses; *** p<0.001, ** p<0.01, * p<0.05. See Table A1 for the labels of the regressors and reference categories.

Table A4. Multinomial logistic regression predicting the probability of entering four fields of study (basic and additional controls): average partial effects, standard errors and statistical significance.

	Cultural			Economic			Relational			Technical		
	1945–1968	1969–1985	1986–2000	1945–1968	1969–1985	1986–2000	1945–1968	1969–1985	1986–2000	1945–1968	1969–1985	1986–2000
female	0.212***	0.223***	0.193***	–0.062	–0.043	–0.018	–0.108**	0.028	0.056	–0.042	–0.208***	–0.231***
	(0.064)	(0.043)	(0.041)	(0.061)	(0.033)	(0.035)	(0.036)	(0.038)	(0.034)	(0.057)	(0.027)	(0.021)
area_2	0.002	–0.002	–0.032	0.025	–0.024	–0.020	0.071	0.001	0.016	–0.098	0.025	0.037
	(0.062)	(0.040)	(0.032)	(0.094)	(0.045)	(0.044)	(0.103)	(0.046)	(0.039)	(0.067)	(0.048)	(0.040)
area_3	–0.028	–0.035	–0.034	0.078	0.016	0.057	0.084	–0.011	–0.017	–0.134*	0.030	–0.007
	(0.056)	(0.035)	(0.029)	(0.078)	(0.041)	(0.040)	(0.086)	(0.040)	(0.033)	(0.064)	(0.043)	(0.033)
educfam	0.003	–0.005	–0.006	–0.002	0.007	–0.005	–0.000	–0.006	0.002	–0.001	0.004	0.009*
	(0.005)	(0.004)	(0.004)	(0.007)	(0.005)	(0.005)	(0.006)	(0.005)	(0.004)	(0.007)	(0.005)	(0.004)
occfam	–0.003**	–0.001	0.001	0.002	–0.001	0.001	0.000	–0.000	0.000	0.001	0.002	–0.003***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
diploma_2	–0.200***	–0.137***	–0.084**	–0.275***	0.054	–0.075	0.095	–0.090*	–0.063	0.381***	0.174**	0.223***
	(0.048)	(0.031)	(0.031)	(0.060)	(0.056)	(0.047)	(0.087)	(0.035)	(0.037)	(0.106)	(0.064)	(0.062)
diploma_3	0.390***	0.121*	0.089	–0.411***	–0.156**	–0.142**	0.117	–0.127**	0.014	–0.097	0.162*	0.038
	(0.100)	(0.054)	(0.051)	(0.037)	(0.050)	(0.051)	(0.116)	(0.039)	(0.053)	(0.103)	(0.078)	(0.068)
diploma_4	–0.113**	–0.193***	–0.074*	0.257***	0.185**	0.017	–0.054	–0.163***	–0.015	–0.090	0.171*	0.073
	(0.039)	(0.028)	(0.033)	(0.065)	(0.066)	(0.051)	(0.050)	(0.032)	(0.041)	(0.065)	(0.068)	(0.055)
failure	–0.013	0.085	0.056	0.114	0.050	–0.009	0.013	–0.019	–0.034	–0.114	–0.116**	–0.013
	(0.062)	(0.047)	(0.048)	(0.081)	(0.047)	(0.050)	(0.068)	(0.044)	(0.041)	(0.066)	(0.039)	(0.041)
break	–0.040	0.131	0.068	0.123	0.024	–0.104	0.051	–0.030	0.203	–0.135	–0.125	–0.168*
	(0.097)	(0.094)	(0.106)	(0.165)	(0.090)	(0.105)	(0.135)	(0.091)	(0.124)	(0.115)	(0.076)	(0.066)
mark	–0.010	0.007	0.006	0.031	–0.012	–0.000	0.012	–0.020	–0.027*	–0.032	0.025	0.022
	(0.018)	(0.013)	(0.011)	(0.026)	(0.014)	(0.014)	(0.022)	(0.014)	(0.013)	(0.027)	(0.014)	(0.012)
Observations	216	654	863	216	654	863	216	654	863	216	654	863
log likelihood	–195.272	–783.654	–1076.767	–195.272	–783.654	–1076.767	–195.272	–783.654	–1076.767	–195.272	–783.654	–1076.767

Source: author's estimates on ILFI (1997; 1999; 2001).

Note: Standard errors in parentheses; *** p<0.001, ** p<0.01, * p<0.05. See Table A1 for the labels of the regressors and reference categories.

Tab. A5. Multinomial logistic regression predicting the probability of graduating from four fields of study in four cohorts of graduates (basic controls): average partial effects, standard errors and statistical significance.

	Cultural				Economic			
	1995	1998	2001	2004	1995	1998	2001	2004
female	0.282***	0.228***	0.241***	0.225***	-0.096***	-0.045***	-0.056***	-0.060***
	(0.013)	(0.009)	(0.012)	(0.013)	(0.010)	(0.008)	(0.011)	(0.009)
area_2	0.035**	0.011	0.012	0.039**	0.017	0.049***	0.001	-0.067***
	(0.011)	(0.009)	(0.012)	(0.014)	(0.014)	(0.012)	(0.016)	(0.012)
area_3	0.023*	0.014	0.002	-0.014	0.071***	0.065***	0.034*	-0.004
	(0.011)	(0.009)	(0.012)	(0.016)	(0.014)	(0.011)	(0.016)	(0.013)
area_4	0.068***	0.043***	0.022	0.023	0.087***	0.102***	0.101***	0.059***
	(0.012)	(0.010)	(0.013)	(0.014)	(0.015)	(0.013)	(0.016)	(0.013)
area_5	0.030*	0.054***	0.023	0.032	0.027	0.005	0.041*	-0.023
	(0.013)	(0.012)	(0.016)	(0.019)	(0.018)	(0.015)	(0.017)	(0.015)
educfam_2	-0.029**	-0.012	-0.029*	-0.020	0.042*	0.007	0.022	0.005
	(0.010)	(0.009)	(0.012)	(0.016)	(0.016)	(0.013)	(0.019)	(0.017)
educfam_3	-0.012	-0.026**	-0.021	-0.017	0.023	0.029*	0.020	0.007
	(0.011)	(0.009)	(0.013)	(0.018)	(0.017)	(0.014)	(0.019)	(0.017)
educfam_4	-0.035**	-0.039***	-0.030*	-0.045*	0.031	0.014	0.021	0.020
	(0.012)	(0.010)	(0.015)	(0.020)	(0.019)	(0.016)	(0.022)	(0.020)
clasfam_2	0.040***	0.045***	0.035**	0.054***	-0.065***	-0.050***	-0.061***	-0.070***
	(0.010)	(0.009)	(0.011)	(0.015)	(0.012)	(0.010)	(0.013)	(0.011)
clasfam_3	0.053***	0.027*	0.033*	0.023	-0.096***	-0.058***	-0.041*	-0.037*
	(0.013)	(0.011)	(0.016)	(0.020)	(0.015)	(0.013)	(0.018)	(0.015)
clasfam_4	0.056***	0.031**	0.038**	0.059***	-0.130***	-0.072***	-0.063***	-0.074***
	(0.014)	(0.011)	(0.014)	(0.018)	(0.015)	(0.012)	(0.016)	(0.013)
Observations	12555	19697	20757	24984	12555	19697	20757	24984
Log likelihood	-15316.3	-24900.1	-26200.5	-32378.9	-15316.3	-24900.1	-26200.5	-32378.9
	Relational/Communicative				Technical/Scientific			
	1995	1998	2001	2004	1995	1998	2001	2004
female	-0.001	0.028***	0.049***	0.046***	-0.185***	-0.210***	-0.234***	-0.211***
	(0.007)	(0.006)	(0.008)	(0.008)	(0.007)	(0.006)	(0.006)	(0.006)
area_2	0.013	0.006	0.044***	0.058***	-0.065***	-0.067***	-0.058***	-0.030**
	(0.011)	(0.008)	(0.013)	(0.012)	(0.010)	(0.008)	(0.010)	(0.010)
area_3	0.030**	0.024**	0.047***	0.083***	-0.125***	-0.103***	-0.083***	-0.065***
	(0.011)	(0.008)	(0.011)	(0.013)	(0.009)	(0.008)	(0.009)	(0.010)
area_4	-0.038***	-0.048***	-0.062***	-0.048***	-0.117***	-0.097***	-0.062***	-0.034***
	(0.009)	(0.007)	(0.009)	(0.008)	(0.009)	(0.009)	(0.010)	(0.010)
area_5	0.045**	0.020	0.014	0.028*	-0.102***	-0.079***	-0.078***	-0.037**
	(0.015)	(0.011)	(0.013)	(0.013)	(0.011)	(0.011)	(0.011)	(0.012)
educfam_2	-0.004	0.004	0.025	0.004	-0.010	0.002	-0.018	0.011
	(0.011)	(0.009)	(0.015)	(0.015)	(0.013)	(0.011)	(0.013)	(0.015)
educfam_3	-0.016	0.010	0.027	0.011	0.004	-0.013	-0.027*	-0.001
	(0.012)	(0.010)	(0.015)	(0.015)	(0.014)	(0.012)	(0.013)	(0.015)
educfam_4	-0.004	0.027*	0.035*	0.031	0.008	-0.002	-0.026	-0.006
	(0.013)	(0.012)	(0.017)	(0.017)	(0.016)	(0.013)	(0.015)	(0.017)
clasfam_2	-0.008	-0.029***	-0.005	-0.006	0.034**	0.035***	0.030**	0.023*
	(0.009)	(0.006)	(0.009)	(0.009)	(0.011)	(0.009)	(0.010)	(0.010)
clasfam_3	0.007	-0.007	-0.008	-0.018	0.036*	0.038**	0.016	0.032*
	(0.012)	(0.009)	(0.013)	(0.012)	(0.014)	(0.013)	(0.014)	(0.015)
clasfam_4	0.020	-0.016	-0.001	-0.014	0.054***	0.056***	0.027*	0.029*
	(0.014)	(0.008)	(0.012)	(0.011)	(0.016)	(0.012)	(0.013)	(0.013)
Observations	12555	19697	20757	24984	12555	19697	20757	24984
Log likelihood	-15316.3	-24900.1	-26200.5	-32378.9	-15316.3	-24900.1	-26200.5	-32378.9

Source: author's estimates on IUGS data (1998; 2001; 2004; 2007).

Note: Standard errors in parentheses; *** p<0.001, ** p<0.01, * p<0.05. See Table A2 for the labels of the regressors and reference categories.

Tab. A.4. Multinomial logistic regression predicting the probability of entering four fields of study in four cohorts of graduates (additional controls): average partial effects, standard errors and statistical significance.

	Cultural				Economic			
	1995	1998	2001	2004	1995	1998	2001	2004
female	0.234***	0.167***	0.197***	0.178***	-0.062***	-0.006	-0.018	-0.029**
	(0.012)	(0.008)	(0.011)	(0.014)	(0.010)	(0.008)	(0.011)	(0.009)
area_2	0.036***	0.011	0.006	0.034*	0.009	0.043***	0.000	-0.069***
	(0.011)	(0.008)	(0.012)	(0.014)	(0.014)	(0.011)	(0.016)	(0.012)
area_3	0.020	0.016*	0.004	-0.005	0.062***	0.056***	0.025	-0.014
	(0.010)	(0.008)	(0.012)	(0.017)	(0.014)	(0.011)	(0.015)	(0.012)
area_4	0.054***	0.036***	0.021	0.026*	0.083***	0.096***	0.093***	0.051***
	(0.011)	(0.009)	(0.012)	(0.013)	(0.015)	(0.012)	(0.016)	(0.013)
area_5	0.025*	0.042***	0.016	0.033	0.018	-0.001	0.032	-0.034*
	(0.012)	(0.011)	(0.015)	(0.018)	(0.018)	(0.015)	(0.017)	(0.015)
educfam_2	-0.027**	-0.012	-0.028*	-0.008	0.044**	0.012	0.029	0.008
	(0.009)	(0.008)	(0.012)	(0.017)	(0.016)	(0.013)	(0.019)	(0.017)
educfam_3	-0.021*	-0.031***	-0.025	-0.008	0.037*	0.047***	0.041*	0.023
	(0.010)	(0.009)	(0.013)	(0.018)	(0.017)	(0.014)	(0.019)	(0.018)
educfam_4	-0.041***	-0.046***	-0.036*	-0.026	0.037	0.038*	0.052*	0.036
	(0.011)	(0.010)	(0.015)	(0.021)	(0.019)	(0.016)	(0.022)	(0.020)
clasfam_2	0.040***	0.046***	0.040***	0.050***	-0.064***	-0.046***	-0.059***	-0.063***
	(0.010)	(0.008)	(0.011)	(0.015)	(0.012)	(0.009)	(0.012)	(0.010)
clasfam_3	0.043***	0.030**	0.035*	0.020	-0.090***	-0.057***	-0.045**	-0.040**
	(0.013)	(0.011)	(0.015)	(0.019)	(0.015)	(0.013)	(0.017)	(0.015)
clasfam_4	0.050***	0.037***	0.044**	0.057***	-0.128***	-0.073***	-0.069***	-0.077***
	(0.013)	(0.010)	(0.014)	(0.017)	(0.015)	(0.012)	(0.015)	(0.013)
diploma_2	0.093***	0.119***	0.093***	0.077***	0.080***	0.051***	0.042**	0.078***
	(0.010)	(0.009)	(0.013)	(0.017)	(0.013)	(0.011)	(0.015)	(0.014)
diploma_3	0.275***	0.302***	0.260***	0.303***	-0.181***	-0.177***	-0.187***	-0.154***
	(0.014)	(0.013)	(0.017)	(0.021)	(0.015)	(0.011)	(0.014)	(0.014)
diploma_4	-0.000	-0.032***	-0.012	-0.006	0.105***	0.136***	0.124***	0.136***
	(0.010)	(0.007)	(0.010)	(0.013)	(0.013)	(0.010)	(0.013)	(0.012)
mark	-0.002***	-0.003***	-0.003***	-0.006***	0.001	0.000	0.000	0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	12555	19697	20757	24984	12555	19697	20757	24984
Log likelihood	-14653.1	-23722.4	-25152.9	-30960.6	-14653.1	-23722.4	-25152.9	-30960.6

Table A.4 (continued).

	Relational/Communicative				Technical/Scientific			
VARIABLES	1995	1998	2001	2004	1995	1998	2001	2004
female	-0.006	0.022***	0.033***	0.035***	-0.165***	-0.183***	-0.213***	-0.183***
	(0.008)	(0.006)	(0.008)	(0.009)	(0.007)	(0.006)	(0.006)	(0.007)
area_2	0.013	0.005	0.043***	0.059***	-0.059***	-0.059***	-0.050***	-0.024*
	(0.011)	(0.008)	(0.013)	(0.012)	(0.010)	(0.008)	(0.010)	(0.010)
area_3	0.029**	0.024**	0.045***	0.081***	-0.111***	-0.096***	-0.074***	-0.062***
	(0.011)	(0.008)	(0.011)	(0.013)	(0.009)	(0.008)	(0.009)	(0.010)
area_4	-0.040***	-0.048***	-0.061***	-0.050***	-0.097***	-0.084***	-0.053***	-0.027**
	(0.009)	(0.007)	(0.009)	(0.008)	(0.010)	(0.009)	(0.010)	(0.010)
area_5	0.037*	0.017	0.011	0.026*	-0.080***	-0.059***	-0.059***	-0.026*
	(0.014)	(0.011)	(0.013)	(0.013)	(0.012)	(0.011)	(0.011)	(0.012)
educfam_2	-0.004	0.006	0.023	0.001	-0.013	-0.005	-0.024	-0.001
	(0.011)	(0.009)	(0.015)	(0.015)	(0.013)	(0.011)	(0.012)	(0.014)
educfam_3	-0.019	0.010	0.020	0.001	0.002	-0.026*	-0.037**	-0.016
	(0.011)	(0.010)	(0.015)	(0.014)	(0.013)	(0.011)	(0.013)	(0.014)
educfam_4	-0.012	0.025*	0.021	0.011	0.016	-0.017	-0.037*	-0.021
	(0.013)	(0.012)	(0.017)	(0.016)	(0.016)	(0.013)	(0.015)	(0.016)
clasfam_2	-0.005	-0.025***	-0.001	-0.005	0.029**	0.025**	0.020*	0.017
	(0.009)	(0.006)	(0.009)	(0.009)	(0.011)	(0.009)	(0.010)	(0.010)
clasfam_3	0.010	-0.005	-0.004	-0.014	0.037**	0.032**	0.014	0.034*
	(0.013)	(0.009)	(0.014)	(0.013)	(0.014)	(0.012)	(0.014)	(0.014)
clasfam_4	0.027	-0.012	0.005	-0.009	0.051***	0.048***	0.020	0.029*
	(0.014)	(0.008)	(0.012)	(0.011)	(0.015)	(0.012)	(0.012)	(0.012)
diploma_2	0.011	0.021**	0.035***	0.018	-0.183***	-0.191***	-0.169***	-0.173***
	(0.010)	(0.008)	(0.010)	(0.011)	(0.007)	(0.006)	(0.007)	(0.007)
diploma_3	0.010	0.023*	0.043**	0.008	-0.104***	-0.148***	-0.115***	-0.157***
	(0.013)	(0.010)	(0.015)	(0.014)	(0.012)	(0.009)	(0.010)	(0.010)
diploma_4	-0.030***	0.003	-0.024**	-0.041***	-0.075***	-0.107***	-0.089***	-0.089***
	(0.008)	(0.007)	(0.009)	(0.009)	(0.008)	(0.007)	(0.008)	(0.007)
mark	-0.004***	-0.002***	-0.002***	-0.001	0.004***	0.005***	0.006***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Observations	12555	19697	20757	24984	12555	19697	20757	24984
log likelihood	-14653.1	-23722.480	-25152.9	-30960.6	-14653.1	-23722.4	-25152.9	-30960.6

Source: author's estimates on IUGS data (1998; 2001; 2004; 2007).

Note: Standard errors in parentheses; *** p<0.001, ** p<0.01, * p<0.05. See Table A2 for the labels of the regressors and reference categories.