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# Transitions into research careers in Switzerland

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## Abstract

This study examines the importance of gender and social origin for the transition of university graduates into the first phase of a research career, the doctoral programme. It also considers whether women and members of lower social classes have better career opportunities in certain fields than in others. The empirical analysis makes use of a panel database that provides information on the education and career paths of Swiss university graduates in all fields of study as of the beginning of the 1990s. The results show that women and people from less educated families are less commonly recruited for research careers than are men and people from university-educated backgrounds. However, the degree of inequality of opportunity is not the same in all of the fields.

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## Introduction

In Switzerland, as in other countries, the next step for someone who finishes a first-degree university programme and wants to work as a researcher, is to enter a doctoral programme. We can assume that the ascribed characteristics of gender and social origin influence this transition to the first stage of a research career because the higher the position, the fewer women there are to be found occupying it (Lie and O'Leary, 1990; Lie *et al.*, 1994; Jacobs, 1996; Sagaria and Stewart, 2002). In a like manner, access opportunities for obtaining qualifications and positions as a researcher are also influenced by one's social origin (Rothstein, 1995; Rothböck *et al.*, 1999; Enders and Bornmann, 2001, p. 43). In Western societies, which are obligated to ensure equal opportunity as a norm, such social barriers represent a major problem for educational policies.

The transition to a research career that takes place after the first university degree is a good stage at which to look at the distribution of access opportunities for university careers by gender and social origin. This is because, in terms of formal qualifications, all graduates are starting out under the same conditions. This study therefore focuses on the degree to which gender and social origin influence the recruitment process for doctoral programmes, and whether they lead to higher than average dropout rates for women and people from less educated families. However, if we consider the multitude of different disciplines that make up the university sector, and the variety of career patterns, work forms and professional cultures that are associated with them, it is easy to see that the world of research is by no means a homogeneous structure. For this reason, the article will also compare the individual fields of study to one another, and examine whether women and the offspring of less educated families have better career chances in some fields than in others.

Initially the article presents some theoretical considerations and hypotheses concerning the recruitment of upcoming researchers. It shows that female students and students from less educated families are at a disadvantage when entering a research career because their social distance from the academic sector makes them less likely to choose such a career, and because they can expect to face



greater cultural hurdles and to receive less encouragement. Several assumptions are also made concerning the differences to be expected in the access opportunities available to women and people born to lower social classes in the individual fields of study. A panel database is used to address these questions as it allows the careers of university graduates to be followed over a period of five years and be statistically analyzed to the probability of their entering a doctoral programme.

### Theory and hypothesis

Bourdieu and Passeron (1979) have shown how for the university sector the two closely related processes of self-selection and social selection result in the progeny of less educated classes dropping out or being eliminated from higher educational and professional career paths. This is because these people have less embodied cultural capital (Bourdieu, 1986). Cultural capital consists of the knowledge, attitudes and manners that are internalized during the familial and school socialization and educational processes, and which become a permanent element of the person, a “habitus”. In the university sector, it is very important to have an intellectual habitus (Bourdieu and Passeron, 1979; Bourdieu, 1988). In addition to being a cultured person and having intellectual curiosity, a claim to leadership, linguistic eloquence, a sovereign bearing and appropriate manners are also prominent characteristics of an academic habitus. Because of their habitus, students from university-educated families are more likely to be recognized and encouraged as budding researchers by their professors than are those without such a background. Students from an academic milieu are also more likely to want to earn a doctorate degree and to strive for an elite position in the university sector. For students whose parents did not graduate from a university, on the other hand, a career in research always means acculturation to a world that is foreign to them, which makes it a less obvious choice. Thus it is assumed that earning a doctorate is a higher hurdle for them than for the sons and daughters of university-educated families, and that they will therefore less frequently enrol in such programmes.

Universities are marked by the centuries-long presence of an educational and social elite, and the exclusion of the working class, but they are also a social space in which males have historically been the sole actors, where they have built up their power and enforced their values. Thus the university is an organization with a clearly gendered substructure (Poole *et al.*, 1997; Allmendinger *et al.*, 2001) and an asymmetrical gender culture (Bellas, 1999). This has resulted in the academic habitus having male traits (Krais, 1993), and it either prevents or at least makes it more difficult for women and men to have career equality (Bielby, 1991). Men exhibiting an academic habitus can act in accordance with society’s stereotypical images of masculinity because the profession of researcher has apparently, masculine connotations (Traweek, 1988; Hagemann-White, 1992; Engler, 2000). Women, on the other hand, are placed in a situation of conflict because of the contradictions between their gendered and professional self-presentations, and this will last for as long as the image of a “typical” researcher is associated with being a man. It is more difficult for women to present themselves and be perceived as competent and ambitious future researchers; men appear to be more suited for such an activity and thus receive more encouragement. Thus, the expectation is for women to be under-represented among doctoral candidates.

Another assumption is that structural, cultural and epistemological characteristics of the individual fields of study play a role in determining the doctoral opportunities available to women and students whose parents are not university educated. The following five theories give rise to hypotheses that are contradictory in part. Using empirical analyses, the paper will examine which of the theories is best suited for explaining field of study differences in the doctoral programme opportunities available to female students and students from less educated families.

#### (1) *Large versus small fields of study:*

- Recruitment and assessment processes are more formalized and bureaucratic in the larger disciplines, and this enhances the probability of the recruitment process being fair (Collinson *et al.*, 1990; Cook and Walters, 1998; Tomaskovic-Devey and Skaggs, 1999). Thus by the

nature of things, medicine, law, economics and business studies would have to provide women and the offspring of less educated parents with greater equality of opportunity to enter doctoral programmes.

- The fact that there is less selection pressure at transition in fields that have a lot of doctoral positions also increases opportunities for women and for students from less educated families (Tomaskovic-Devey, 1993; Tomaskovic-Devey and Skaggs, 1999). Since about 50 percent of graduates in the exact and natural sciences[1] go on to earn a doctorate, female students and students from less educated social strata should have good opportunities in these fields (see Table I).
- (2) *The role of the labour market outside the university.* People in fields that offer good professional opportunities outside the university are less interested in a university research career because such positions offer less job security and do not pay as well. As a result, members of disadvantaged groups have good opportunities to earn a doctorate in such fields. We can thus expect medicine – and law, economics and business studies in particular – to offer good doctoral opportunities to women and people from less educated backgrounds.
- (3) *Gender ratios: contact theory versus competition theory.* Integration

opportunities will vary depending on the percentage of women present in an institution (Kanter, 1977). Women are more likely to find good working and networking conditions, and support for a research career, in fields that have a high percentage of women (Rothstein, 1995; Neumark and Gardecki, 1998). The contact theory holds that the contact between the sexes during studying and working will reduce the prejudices that male scientists have about female scientists (Kanter, 1977). It is reasonable for us to assume that women will increasingly serve as role models in such fields, but that fields such as technology, mathematics, physics, and some areas of the natural sciences, where few women are to be found, will be strongly oriented towards male traits. In these areas, gender stereotypes and prejudices will continue to play a considerable role in the recruitment processes and integration practices of their male scientists.

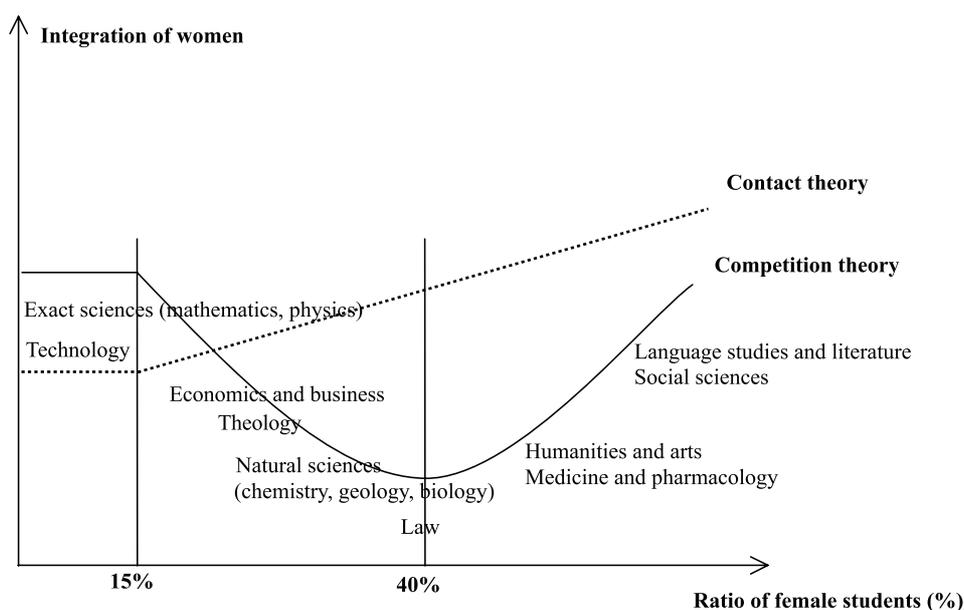
However, the competition theory (Tolbert *et al.*, 1995), which developed out of the contact theory, assumes that women will not be perceived as rivals by men if there are very few of them in the field because they will not threaten the men's traditional privileges. As a result, the women will receive sufficient encouragement and be the subject of enough well-meaning interest to feel integrated (South *et al.*, 1982; Rogers and Menaghan, 1991; Allmendinger and Hackman, 1999). In disciplines in which women are no longer a small minority but still not great in number, men will perceive the women as competitors and, for this reason, will discriminate against them (Tolbert *et al.*, 1995). From a certain level on, the situation for women initially deteriorates as their percentage rises (Toren and Kraus, 1987; Tolbert *et al.*, 1995). It is only when female researchers are present in larger numbers – Tolbert *et al.* (1995) estimate about 35–40 percent – that their problems abate to a notable degree.

If the contact theory is valid, conditions for earning a doctorate will probably be poor for women in mathematics, physics and technology, and steadily better in the other disciplines as the proportion of women increases (see Figure 1). But if the

Table I 1988 graduates in doctoral programmes (status: 1993)

	In a doctoral programme in 1993?			
	Not yet begun		In programme or finished	
	<i>n</i>	(%)	<i>n</i>	(%)
Theology	41	89.1	5	10.9
Language studies and literature	86	81.9	19	18.1
Humanities and arts	92	66.7	46	33.3
Social sciences	150	82.4	32	17.6
Economics and business	210	82.7	44	17.3
Law	227	76.9	68	23.1
Exact sciences (mathematics, physics)	70	54.3	59	45.7
Natural sciences (chemistry, geology, biology)	104	46.6	120	53.6
Medicine and pharmacology	111	43.0	147	57.0
Technology	215	87.8	30	12.2
Total	1306	69.6	570	30.4

**Figure 1** Integration of women in different fields of study



competition theory is correct, doctorate opportunities would have to be better in the same three fields – mathematics, physics and technology – than in economics, business studies, the natural sciences or theology. The tipping point is likely to be found in law. After this, the problems and contradictions experienced by women should lessen again.

- (4) *The social space of the fields of study: research versus social competencies.* Pierre Bourdieu postulates that cultural capital and thus the academic habitus plays a different role in the various fields of study depending on where the field is situated in the university's space (Liebau and Huber, 1985; Bourdieu, 1988).

In disciplines that are located at the society-dominating pole of the university's social space and which involve a large amount of total capital (see Figure 2, quadrants 1 and 2), it is important to have an easy familiarity with the legitimate or "high" culture, eloquence, an intellectual orientation and healthy self-confidence – i.e. social competencies if one is to be integrated. Because the possession of such inherited cultural and economic capital is so important, access opportunities for people born to non-university-educated families are reduced.

In contrast to this, more importance is attributed to research expertise, and less to extra-functional characteristics, in

disciplines that are located at the research-dominating pole of the university's social space and which involve a small amount of total capital (Figure 2, quadrants 3 and 4). Since cultural capital plays a subordinate role in research success, social origin has fewer consequences for selection practices and performance assessments in these areas. As a result, women are under less pressure to reconcile their gender identity with the presentation of an academic habitus that has masculine traits. They are thus taken more seriously as researchers, and there will be greater equality of opportunity.

- (5) *Epistemological differences: cognitive consensus and task uncertainty.* Various studies have shown that there is more consensus in the natural sciences and in mathematics and physics concerning the questions to be asked, theoretical explanations, and the processes and methods of knowledge production, than there is in the social sciences and humanities (Lodahl and Gordon, 1972; Zuckerman and Merton, 1971). Within this context, the theory has been put forward that a high degree of cognitive consensus (Kuhn, 1996) and of task certainty (Whitley, 1982) will result in more objective judgements and more universal processes. In contrast, as cognitive dissensus and task uncertainty increase, so does the space for

**Figure 2** Location of fields of study in university social space

Language studies and literature Humanities and arts	1	+	Law Medicine	Economics and business
<b>Research-dominating fields</b>	4	3	<b>Society-dominating fields</b>	
Social sciences				
Theology				
Natural sciences (chemistry, geology, biology) Exact sciences (mathematics, physics)			Technology	
		-		

**Based on:** Bourdieu (1988); Liebau and Huber (1985)

assessments based on ascribed characteristics such as gender and social origin. Recruitment and selection decisions are then made less on the basis of performance and achievement, and increasingly on the basis of ascribed characteristics and social relationships (Pfeffer *et al.*, 1977; Cole, 1979; Hargens and Hagstrom, 1982).

It is assumed, therefore, that university graduates in mathematics, physics and the natural sciences are perceived and integrated into the research community more on the basis of their performance. Gender and social origin are less important, and opportunities are more likely to be equal.

**Data**

The analyses are performed on data collected by a group of university study programme and vocational counsellors who surveyed the career performance of university graduates[2]. All persons who graduated from a Swiss university in 1988 were surveyed twice, in 1989 and again in 1993; both times they were asked about any additional qualifications they might have earned and their professional activity.

The 1989 questionnaire was mailed to 8,459 people. Of the 4,899 questionnaires that were sent back (a return rate of 58 percent), 4,856 could be included in the statistical analyses. Of these 4,856 respondents, 3,485 agreed to be surveyed a second time. In 1993, a total of 3,156 questionnaires were sent to these persons'

updated addresses. The second survey had a return rate of 74 percent; of the 2,331 persons who responded, 2,309 could be taken into the statistical analyses. An evaluation of the representativeness of the sample relative to the total population shows that for the 1989 survey, the gender distribution of the available database closely matches that of the statistics. Technology fields are somewhat underrepresented, while theology, law and the natural sciences are slightly overrepresented. In the 1993 follow-up survey, the percentages for the characteristics being examined are virtually identical to those of the first survey. So we can assume that the data are highly representative.

The following analyses will only include persons who:

- graduated from the university in 1988 with a first university degree[3]; and
- participated in both the 1989 and 1993 surveys.

This sample consists of 1,876 persons.

**Method and variables**

Logistic regressions are employed as the statistical estimating equation (Hosmer and Lemeshow, 1989; Demaris, 1992). The dependent variable always has two attributes. In our case, the question is always whether or not the person entered a doctoral programme. The model estimates simultaneously the partial effects of a number of independent variables on the relative probability that the event will occur. This procedure allows us to calculate the influence of a specific variable

while controlling for the remaining independent variables. The analyses were carried out using SPSS statistics programmes, version 9.0.

### Dependent variable

In the 1989 questionnaire, the university graduates stated whether they had entered a doctoral programme the previous year. The variable has the value of 1 if the answer is “yes”, and 0 when the answer is “no”. This question was repeated in 1993; here the variable is coded with 1 if the person was in a programme or had already completed it, and 0 if this is not the case.

### Independent variables

The parents' education is used to represent social origin, with dichotomous variables employed to break it into six levels:

- (1) compulsory schooling, basic secondary level schooling or basic vocational training;
- (2) traditional apprenticeship;
- (3) full-time vocational schooling, intermediate-level general education without matriculation;
- (4) full “maturity” (secondary-school-leaving) certificate, non-university teaching certificate;
- (5) advanced vocational training, lower-level tertiary degree with a vocational orientation such as from a technical college; and
- (6) university education (used as the reference category).

### Control variable

#### *Field of study*

As Table I shows, the percentage of graduates who go on to a doctoral programme can vary enormously from one field to the next. This is because in some disciplines a doctorate is not just the next step in a research career, it is also an important educational certificate for the labour market outside the university. Today it is almost impossible to have good career opportunities in medicine or chemistry without a doctorate. For this reason, the fields of study have been controlled for in the estimating models. With the exception of mathematics, physics, the natural sciences, medicine and pharmacology, it is assumed that the probability of earning a doctorate is smaller in all of the other fields than in the humanities and arts, which serve as the reference category.

## Results

### Inequality of opportunity when entering a doctoral programme

In what follows, the focus is on the question of who among the 1988 graduates entered a doctoral programme in the first five years following graduation. The estimates are shown in Table II. The 1989 section (with the results for the first survey) shows the probability of entering such a programme in the first year following receipt of the first university degree. The 1993 section (for the second survey) shows, for purposes of comparison, the probability of being in or having concluded such a programme five years after completing undergraduate studies. Reference is made to both models when interpreting the results. If the variables examined have the same effect for both surveys, we can assume that the factor's influence on the probability of earning a doctoral degree is consistent. Where differences are observable, the developments and changes will be examined more closely.

For 1989 (models 1 and 2), included in the estimates are, first, the father's education alone, and then the education of both parents, because the influence of the father's education changes greatly as soon as the mother's educational level is added. Thus the effect of the father's education is not independent of that of the mother's. We can assume that the educational level of both parents taken together characterizes the educational environment.

Turning to the significance of gender, we see that men earn a doctoral degree significantly more often than women: the probability of men doing so is roughly twice as large as for women, and it increases slightly during the first few years[4]. Thus one of the very first hurdles that has to be overcome in a research career is set at different heights for the two sexes, a fact that causes doubts to arise and initiates an elimination process when women are just starting out in their professional lives. It is assumed that women receive notably less encouragement to earn a doctoral degree, and that they have more difficulty taking this step on their own.

Another factor influencing the opportunity to earn a doctorate is the cultural resources provided by one's background. If we look at model 1 for 1989 with only the father's education included, it is clear that having a father with a very low educational level

**Table II** Factors determining whether a doctoral programme is begun during first five years following receipt of first university degree

Logistic regression	1989 survey		
	Model 1	Model 2	1993 survey
Sex (female)	– ****	– ****	– ****
<b>Father's education</b>			
1 Compulsory schooling, basic secondary level schooling, basic vocational training	– ****	–	– *
2 Traditional apprenticeship	+	+	+
3 Full-time vocational schooling, intermediate-level general education without matriculation	–	–	+
4 Full maturity certificate, non-university teaching certificate	–	–	– ***
5 Advanced vocational training, lower-level tertiary degree with vocational orientation	–	–	+
6 University education	/	/	/
<b>Mother's education</b>			
1 Compulsory schooling, basic secondary level schooling, basic vocational training		– ***	– *
2 Traditional apprenticeship		– *	–
3 Full-time vocational schooling, intermediate-level general education without matriculation		– **	–
4 Full maturity certificate, non-university teaching certificate		–	+
5 Advanced vocational training, lower-level tertiary degree with vocational orientation		–	–
6 University education	/	/	/
<b>Field of study</b>			
Theology	– ****	– ****	– ***
Language studies and literature	– *	– *	– **
Humanities and arts	/	/	/
Social sciences	– ****	– ***	– *
Economics and business	– ****	– ****	– ****
Law	– ****	– ****	– ****
Exact sciences (mathematics, physics)	+	+	+
Natural sciences (chemistry, geology, biology)	+ *	+ **	+ **
Medicine and pharmacology	+	+	+ ***
Technology	– ****	– ****	– ****
<i>n</i>	1817	1817	1817

Notes: Shown are the signs of the effect coefficient (B) and their levels of significance (Wald test): \*  $p \leq 0.10$ ; \*\*  $p \leq 0.05$ ; \*\*\*  $p \leq 0.01$ ; \*\*\*\*  $p \leq 0.001$

sharply reduces the probability of going for a doctoral degree. The remaining educational categories, with the exception of apprenticeship, likewise have a negative impact compared to when the father is a university graduate, but they are not statistically significant. However, including the mother's education causes the statistically significant negative influence of having a father with the lowest educational level to disappear. The mother's education has an independent effect: all educational degrees

below the university level, in particular if it is at one of the lowest three educational levels, seem to make it more difficult for the woman's children to enter a doctoral programme. The overall results for 1993 are similar to those for 1989, but the negative influence of the mother's education is only statistically significant for the lowest educational level. If the father's education is at level 1 (compulsory schooling, basic secondary level schooling or basic vocational training) or level 4 (full "maturity"

[secondary-school-leaving] certificate, non-university teaching certificate), his daughters and sons will also find it more difficult to enter a doctoral programme than will the children of university-educated fathers. How should these findings be interpreted?

Upcoming researchers whose mothers attended university have better opportunities to earn a doctorate. They normally come from an environment with a great deal of cultural capital because their fathers rarely have an educational degree that is lower than their mother's. Thanks to their origin, they have resources and opportunities that make it easier for them to decide to go for a doctorate. In contrast, the doctorate is more remote and less a matter of course for university graduates who do not have such a family background. They are at a serious disadvantage with regard to having further access to the academic world, especially if neither parent has much education beyond compulsory schooling.

Finally, there are the fields of study. It is much less common for people to seek a doctoral degree in theology, language studies, the social sciences, economics, business studies, law or technology than in the humanities or arts. In the natural sciences, on the other hand, the opportunities are somewhat greater. Still, it is interesting to note that history and philosophy graduates are just as likely to earn a doctoral degree as physicists and mathematicians. It is intriguing that many future medical doctors only decide to seek a doctorate during their first years of professional life. They may feel that it is more urgent to find an appropriate position as an intern and for this reason postpone their doctoral degree for a bit.

#### **Differences between the fields of study**

The main question dealt with in this section is how structural, cultural and epistemological differences within the university impact a graduate's access opportunities to a doctoral programme. As described above in the theoretical section, class and gender can have different weights in the various fields. Thus whenever the number of cases permitted, estimates for the probability of participating in a doctoral programme are performed separately for each domain. Because of the small number of cases for theology, this field had to be eliminated. Table III contains the results for both the 1989 and 1993 surveys grouped together to better show the overall

picture; the detailed results of the estimates are contained in Table IV. Let us begin with the effect of gender.

In fields that are favoured by women (language studies, literature, the social sciences, law, medicine and pharmacology), being a woman has, at times, a distinctively negative effect. Women in these fields (in which they are overrepresented as students) have poorer opportunities to enter a doctoral programme than do their male colleagues. This is in contradiction to Kanter's contact theory. In addition, it appears that female professors and other female university teachers, who are also present in somewhat greater numbers than in other fields, do not fulfil the role model function that is often attributed to them.

Task certainty and cognitive consensus, which are present to only a limited degree in the social sciences, languages and literature, seem to have more explanatory power than the contact theory. The lesser amount of task certainty can cause a characteristic such as gender, which is irrelevant for research work, to be weighted more heavily when assessing performance. The career advances of men are also greater in the social sciences, language and literature because there are few promising positions available outside the university. Doctoral programmes play a larger role here in recruiting future researchers than in other fields. In order to prevent the progressive feminization of these fields, which would lead to their further devaluation in the academic hierarchy (Kirsch-Auwärter, 1995), university teachers prefer to recruit men for doctoral programmes.

It is difficult to find a reasonable explanation for the much lower percentage of female doctors who earn a doctorate. It remains unclear as to why women have a harder time dealing with this transition in their educational status which, in the medical field at least, is not very demanding.

What is the explanation for the large negative effect on doctoral opportunities for women in the natural sciences? Despite the many doctoral candidate positions in chemistry and biology, and the importance of having such a degree when looking for a job outside the university, the opportunities in these areas are not any better for women. Neither the lesser importance attributed to the academic habitus nor the greater cognitive consensus result in women being given or taking advantage of the same opportunities as

**Table III** Overview of factors determining whether a doctoral programme is begun during the first five years following receipt of first university degree: differences between the fields of study

	1989 survey		1993 survey	
	Negative effect for women	Negative effect for lower social classes	Negative effect for women	Negative effect for lower social classes
Language studies and literature	---		---	
Humanities and arts	--	---		
Social sciences	---		---	
Economics and business				-
Law			---	--
Exact sciences (mathematics, physics)		--		---
Natural sciences (chemistry, geology, biology)	---	--	---	
Medicine and pharmacology		--	---	
Technology				-

**Notes:** --- Strong effect: effect for women: the indicator is significant when  $p \leq 0.01$ . Effect for lower social classes: the education of the father and/or mother always has a negative effect when it is lower than university level. The effect of at least one of the two is significant when  $p \leq 0.05$ ; -- Medium effect: effect for women: the indicator is significant when  $p \leq 0.05$ . Effect for lower social classes: the education of the father and/or mother always has a negative effect when it is lower than university level. The effect of at least one of the two is significant when  $p \leq 0.10$ ; - Weak effect: effect for women: the indicator is significant when  $p \leq 0.10$ . Effect for lower social classes: the education of the father and/or mother always has a negative effect when it is lower than university level, but it is not statistically significant. The detailed results of the estimates are shown in Table IV

men. Instead, the results point in the direction of the competition theory, especially when gender-specific equality of opportunity in the exact sciences and technology is taken into account. Women are still a small minority in the latter two fields. Because they are not perceived to be threatening or to represent competition, they receive the same encouragement and support as their male colleagues. Thus the perception that women have more difficulty in technology, mathematics and physics, fields that are permeated with masculinity, is not confirmed here. In the natural sciences, on the other hand, women are no longer a small minority, and the lesser likelihood of their earning a doctorate can be interpreted as a defence against further feminization of this area.

The gender equality apparent in economics and business studies is interpreted as the result of two factors: the unequally promising professional opportunities available to men outside the university, which only occasionally require a doctoral degree; and the recruitment processes, which are more formalized and bureaucratic since this area is so large. However, even though these factors hold true in the field of law as well, women do not have better opportunities to obtain a doctorate in this area.

We now come to the significance of cultural capital. Except for mathematics and physics,

there are no clear and constant effects of low social origin on entry into a doctoral programme. As a result, it is not possible to say anything about the explanatory power of the five theories discussed above.

## Conclusion

The present study examines the transition of university graduates to a doctoral programme as the first step in a research career. It focuses on the extent to which gender and social origin influence this transition in violation of the principle of equality of opportunity. It also looks at whether these ascribed characteristics have the same weight in the recruitment processes of the different fields of study.

In order to answer these questions, panel data providing information on the educational and professional careers of university graduates in Switzerland, as of the beginning of the 1990s, was analysed. The results show that the doctorate is a very high hurdle for women. Men earn the degree twice as often as women do, and this gap continues to widen during the first few years of their working lives. Women presumably drop out of doctoral programmes more often, while men will still enter them later on in time. Thus the cooling out process for

**Table IV** Factors determining whether a doctoral programme is begun during first five years following receipt of first university degree: differences between the fields of study

Logistic regression	Language studies and literature		Humanities and arts		Social sciences		Economics and business		Law	
	1989	1993	1989	1993	1989	1993	1989	1993	1989	1993
Sex (women)	–***	–****	–**	–	–***	–***	+	–	–	–***
Father's education										
1 Compulsory schooling, basic secondary level schooling, basic vocational training	+	+	–	+	–	–	–	–	–	–
2 Traditional apprenticeship	+	+	+	+	–	+	+	–	–	–*
3 Full-time vocational schooling, intermediate-level general education without matriculation	–	–	+	–	+	+	+	–	–	–
4 Full maturity certificate, non-university teaching certificate	+	+	–	–	–	–	–	–	–	–
5 Advanced vocational training, lower-level tertiary degree with vocational orientation	+*	+	–	–	+	+	–	–	+	–
6 University education	/	/	/	/	/	/	/	/	/	/
Mother's education										
1 Compulsory schooling, basic secondary level schooling, basic vocational training	–	–*	–*	–	+	+	–	+	+	–
2 Traditional apprenticeship	+	+	–*	–	+	–	+	+	+	–
3 Full-time vocational schooling, intermediate-level general education without matriculation	+	+	–**	–	+	–	–	–	+	–
4 Full maturity certificate, non-university teaching certificate	+	+	–	+	+	–	–	–	+	–
5 Advanced vocational training, lower-level tertiary degree with vocational orientation	+	–	–	+	+	+	–	–	–	–
6 University education	/	/	/	/	/	/	/	/	/	/
<i>n</i>	100	100	134	134	177	177	248	248	284	284
			Natural sciences							
			(chemistry, geology, biology)		Medicine and pharmacology		Technology			
Logistic regression			Exact sciences (mathematics, physics)		1989	1993	1989	1993	1989	1993
Sex (women)	+	+	–****	–***	–	–***	+	–		
Father's education										
1 Compulsory schooling, basic secondary level schooling, basic vocational training	–*	–**	+	–	–	+	+	–		
2 Traditional apprenticeship	+	–	+	–	+	+	–	–		
3 Full-time vocational schooling, intermediate-level general education without matriculation	+	+	+	–	–	+	–	–		
4 Full maturity certificate, non-university teaching certificate	–*	–**	+	–	+	–	+	–		
5 Advanced vocational training, lower-level tertiary degree with vocational orientation	–	–	+	+	–	+	–	–		
6 University education	/	/	/	/	/	/	/	/		

(continued)

Table IV

Logistic regression	Natural sciences							
	Exact sciences (mathematics, physics)		(chemistry, geology, biology)		Medicine and pharmacology		Technology	
	1989	1993	1989	1993	1989	1993	1989	1993
<b>Mother's education</b>								
1 Compulsory schooling, basic secondary level schooling, basic vocational training	-	+	-**	-	-**	-	-	-
2 Traditional apprenticeship	-	-	-	+	-**	-	+	-
3 Full-time vocational schooling, intermediate-level general education without matriculation	-	-	-	-	-**	+	-	-
4 Full maturity certificate, non-university teaching certificate	-	-	-*	+	-	+	-	-
5 Advanced vocational training, lower-level tertiary degree with vocational orientation	-	-	-	-	-	+	+	-
6 University education	/	/	/	/	/	/	/	/
<i>n</i>	124	124	219	219	246	246	241	241

Notes: Shown are the signs of the effect coefficient (B) and their levels of significance (Wald test): \*  $p \leq 0.10$ ; \*\*  $p \leq 0.05$ ; \*\*\*  $p \leq 0.01$ ; \*\*\*\*  $p \leq 0.001$

women begins as soon as they get their first university degree even though, in formal terms, both genders are in the same starting position. This is the same result as has been found in other studies. As soon as women try to climb the academic career ladder, they are confronted with higher thresholds (Etzkowitz *et al.*, 1992; Sonnert and Holton, 1995). More women than men founder and are unable to even enter the research system. In addition, those who do make it past this threshold are confronted with many more obstacles, large and small, in the course of their professional careers, which is why Toren and Moore speak of a "hurdle race" (Toren and Moore, 1998).

However, access opportunities vary from field to field. In economics, business studies, mathematics, physics and technology, once women have received their first university degree they have just as much access as men to doctoral programmes, a major qualification milestone. In contrast, their integration opportunities in language studies, literature, the social sciences and the natural sciences are extremely poor. Inequality also exists in the remaining fields, but to a lesser degree.

Students from less educated families have somewhat poorer opportunities to earn a doctorate, especially in mathematics and physics. Unless their fathers completed an apprenticeship, such graduates more rarely

enter a doctoral programme than do those whose parents have a university education. This continues to represent a problem for Switzerland, which has equality of opportunity as one of its ideals.

### Notes

- 1 In Switzerland, mathematics and physics are called the "exact sciences", while chemistry, geology and biology make up the "natural sciences".
- 2 The Arbeitsgemeinschaft für akademische Studien- und Berufsberatung (AGAB).
- 3 Lizentiat, Diplom or Staatsexamen.
- 4 Exponentiating the effect of coefficient *B* (not shown in the table) enables us to determine the net effect of gender. For 1989:  $e^B - e^{-0.61} = 0.54 \sim 1 : 1.9$ . For 1993:  $e^B = e^{-0.77} = 0.46 \sim 1 : 2.2$ . The resulting value corresponds to the ratio of the doctorate probability of women and men.

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