

Occupational outcomes of PhD graduates in Northern Italy

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Abstract: The paper studies the occupational outcomes of the PhDs from three Northern Italian universities. First, it shows that the number of PhDs awarded in Italy has increased more than the demand for PhD holders: it can be hypothesized, then, that PhD holders will front increasing difficulties in finding a job related to their training. By means of multinomial logistic models, the paper then analyzes the probability for PhD holders to get a research job, inside or outside the University. Furthermore, their wages are studied by means of linear regression models. Results show that the university remains the main occupational outcome for PhDs, especially in social sciences and in the humanities. However, wage returns are larger for those PhDs who are employed outside the university, both in research and in the professions.

Keywords: PhD, occupational outcomes, academic job, research

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Presentation

A recent position paper by the League of European Research Universities states that “the modern doctorate is an excellent training for those who go into roles beyond research and education, in the public, charitable and private sectors, where deep rigorous analysis is needed” (Leru, 2010: 3). What is relevant to this statement is the idea that the labour market of PhDs is not limited anymore to research and education: this is normal for the American tradition of graduate studies, but quite new for the European tradition, that has typically considered the PhD course as a training for future researchers and university professors (Gumport, 2002).

Our aim with this paper is to check whether such a statement is relevant for the Italian case. This is a relevant one from this point of view, as the PhD course has been instituted quite recently. Its introduction was intended as a reform of the recruitment process in a system where recruitment used to rely more on direct contact and personal relations than on a standardized certification, as the PhD title is. By means of multivariate analysis, we will look at the occupation outcomes and the wages of a sample of Italian PhDs from three major Northern Italian Universities, checking to what extent they get different kinds of non-university and non-research jobs, and which are the factors influencing both PhDs’ occupational outcome and wages. The paper is structured as follows. Section 2 gives some information about the history of the PhD course in Italy, and develops some hypotheses on this base. Section 3 presents data and methods, while section 4 describes our findings. Section 5 concludes³.

The PhD course in Italy

The PhD course has been instituted quite lately in Italy. Earlier, recruitment to university teaching and research used to depend on personal contacts between senior and junior scholars. As in other Continental countries, university courses in Italy were quite long. They lasted at least 4 years, in some cases even 6, and the high level of the teaching and the

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toughness of the examinations would guarantee a full specialized training in the chosen discipline⁴. Moreover, the final dissertation had to be a piece of (at least partly) original research, often conducted in the frame of the research activities of the tutor, and work leading to it could last for several years. After graduation, professors would directly recruit their best students to be their collaborators, in research and in teaching. After some time and a lot of work, junior scholars could stand an examination leading to a title, called *libera docenza* (free teacher), that would enable them to be called to an university chair. In order pass the exam and become a *libero docente*, a scholar had to write down a dissertation, based on original research work and to be published afterwards, and defend it before a committee of senior scholars of the discipline.

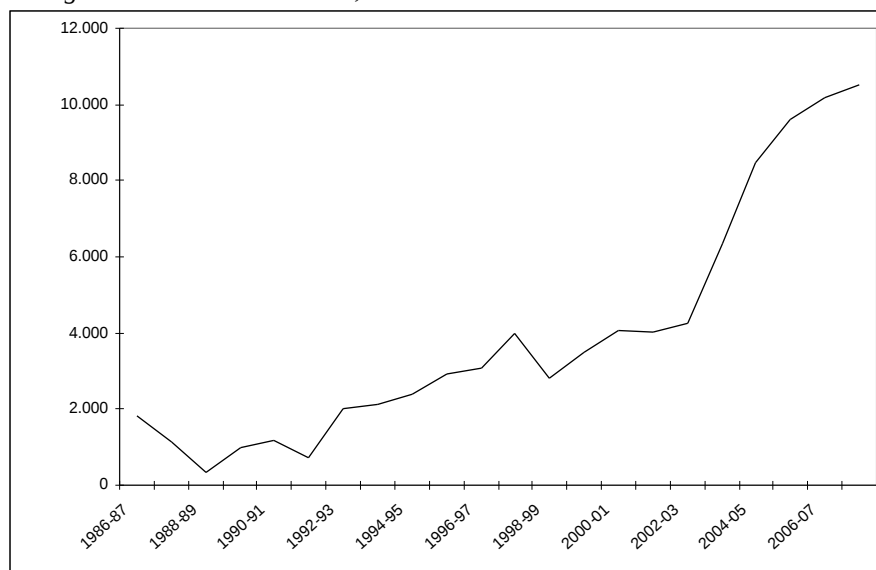
This kind of title still exists in some countries, as in Germany (*Habilitation*), but in Italy it was abolished in 1970. The reason for abolishing it was one of misuse: in professions such as law and medicine, to have a *libera docenza* would raise a professional's prestige and income, so that a race for the title had begun, to the point that it had lost its original function of entrance door to the academy. When it was abolished, the *libera docenza* left of course an institutional void, that was filled in ten years time by the reform law of 1980 (law 28/1980 and presidential decree 328/1980). The latter included the introduction of the PhD course in the context of a general reform of university professors careers and recruitment, and the PhD (*dottorato di ricerca*) was defined as "an academic title, that has a value only in the context of scientific research" (presidential decree 328/1980, art. 68). Admission took place by means of an examination. Each PhD student received a three-year grant by the state, and was expected to finish her research work in three years. The final dissertation was judged by a committee of senior scholars of the discipline. Courses started in 1982, and the first titles were awarded in 1985.

It is thus clear, from both the regulative context and the content of the regulation, that the PhD courses and title were introduced to regulate and rationalize access to academic careers. The only major change in this

⁴ In the traditional Continental curricula, students would go to academic secondary school until they were 18-19 years old, and at this point they were thought to have the general cultural basis to start specializing. At the contrary, in America students finished high school at 16-17, and college education had the task to complete their general training. Graduate school was, and still is, the place to get a specialized disciplinary training. See Gumport (1992) and Collins (2000).

regulation took place in 1999, when universities were authorized to accept PhD students without grant. Since then, about a half of the PhD students are granted, but the proportion varies among disciplines. This change of regulation was an answer to a process of expansion that can be observed from figure 1, that shows the number of PhD graduates for each academic year since the very start of the courses.

Figure 1. PhD titles awarded, 1986-2008



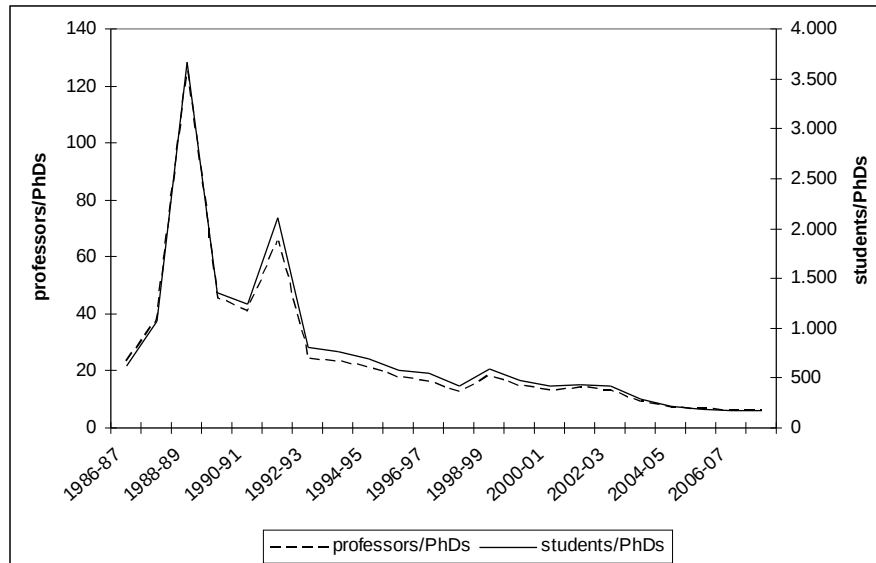
Source: 1986-87 to 1997-98 Istat (2003); from 1998-99 Miur (2008).

The pattern is clear: in the first 15 years there is a steady but relatively slow expansion from about 1.000 PhD graduates per year to about 4.000, including some major fluctuations. Then since the 1999 reform the number of graduates has exploded, reaching 10.000 in a few years, and leveling off since.

What is of more importance, is that such an increase in the number of PhD graduates has been more than proportional with respect to the overall expansion of Italian universities. This can be seen in figure 2, showing the ratio between professor and students on one side and PhDs on the other.

Both ratios decrease steadily over time, showing an unbalance between the demand of universities and the offer of PHD graduates.

Figure 2. Ratio among professors, students and PhD graduates, 1986-2008



Source: for PhDs see note to fig. 1; for students CNVSU (2009); for professors: 1986-87 to 1989-90 CNVSU (2002), 1990-91 to 1996/97 Istat (2003); 1997/98-2007/08 CNVSU (2009).

Why has it been so? There is not much research on the choices of university graduates after finishing their degrees. However, it is not hard to guess which mechanisms could be at work. For what university graduates are concerned, we suspect the increase in the enrollments to the PhD courses has to do with the worsening of their occupational perspectives. In fact, according to the data of the Istat surveys on the occupational outcomes of university graduates, from 1998 to 2004 the percentage of graduates achieving a permanent job has declined from about 49% to 33.5 %, while the percentage of graduates achieving an unstable job has risen from about 25% to 33% (Ballarino and Bratti, 2010). The classical research by Barbagli (1982) on the relation among school and employment in Italy has

shown that often participation to both secondary school and university has expanded when employment opportunities were lower, with an anti-cyclical pattern that has been labelled “university as a parking lot”. So, it is by no means surprising to see a similar pattern arise also for graduate education. From what professors are concerned, it is clear that to have a doctoral program increases the prestige of professors and departments. Moreover, doctoral students often work as both teaching and research assistants, and their work comes for free to the professors, as the grants are directly paid by the Ministry.

However, what is relevant from the point of view of this paper is that both university and research cannot absorb the number of PhDs produced yearly by the Italian university system. From an Italian point of view, the Leru statement referred to above seems important, as the only way to avoid unemployment among PhDs is that they enter a non-academic and non-research labour market. This is where the research questions of this paper start. First, we will look at the occupational outcomes of the PhDs, asking whether it is true, as most of the available research shows, that the occupational outcomes of the Italian PhDs students are far from satisfying (Moscatti, 2010). Second, we distinguish and contrast academic and non-academic occupational positions: we hypothesize that the PhD’s chances of getting an academic position have been decreasing over time, because of the demand-supply imbalance described above. Moreover, we distinguish among different kinds of non-academic positions and look at the determinants of the PhD’s chances to enter one among them: such an analysis could be relevant for future policies aimed at improving their employment chances. Third, we look at the wages associated with different kinds of academic and non-academic positions accessed by PhDs.

Data and methods

In order to answer the questions outlined above, we use individual data collected in a survey on PhD graduates employment destinations. The survey was carried out in May-June 2006 on PhDs who had achieved their titles between 1998 and 2005 from the Universities of Milano, Milano-Bicocca, and Trento, three major universities placed in the North of Italy (Schizzerotto, 2007). In fact, for the time being in Italy there is no national

surveys of PhD students, just local ones, and the one we are considering is the most recent and the most extensive whose micro-data are publicly available (see Moscati, 2010 for an overview of the existing data sources). This is a survey on the whole population of 1,784 PhDs graduated from 1997 to 2005 at the universities of Milano, Milano-Bicocca and Trento. The number of respondents amounted to 1,179. The questionnaire was administered using Computer-Assisted Telephone Interviewing (CATI) and concerned PhDs' working episodes after their graduation. For the specific purposes of our analysis we considered the last working episode by selecting individuals employed at the time of the interview. The number of valid cases for the multivariate analyses was 1,140.

Our study has two dependent variables: kind of job achieved and average monthly income. While the latter was directly asked in the questionnaire (question F03), the former required some coding work in order to have a detailed measure of the occupational situation of PhDs at the time of the survey. Substantively, we are interested in the coherence between training for research, that as stated before is the traditional occupational purpose of Italian doctoral courses, and the activity actually performed. This is why, while previous analyses of the same data only distinguished among academic and non-academic jobs (Schizzerotto, 2007), we get more in detail and distinguish 4 categories, coded 0 to 3 as follows: non-research jobs (e.g.: teachers, managers); non-academic research jobs; professional jobs (classic professions: physicians, lawyers and engineers, excluding business consultants and the like); academic research jobs (in any position, even unstable, including CNR and similar public research institutions). We assume that traditional professions involve activities related to research (analysis, documentary research, etc.) and that jobs such as teacher or business manager, despite having a high cognitive content, do not *per se* require research activities in the strong sense of the word.

We based the coding on the respondents' statements to 3 questionnaire items (D05, D06 and D07). The first two items required respectively the name of job and the task performed. Unfortunately the questionnaire did not ask which was the respondents' place of work (company or institution), so the distinction between non-academic and academic research in some cases wasn't easy.

Table 1. Sample description

	<i>Number of valid cases</i>	<i>Share of valid cases</i>
Sex		
Male	561	48.2%
Female	604	51.8%
Total	1,165	100.0%
Age	1,164	99.9%
University		
Milano	798	68.5%
Milano-Bicocca	109	9.4%
Trento	258	22.1%
Total	1,165	100.0%
Cycle		
From VIII to XII	193	16.6%
XIII	142	12.2%
XIV	171	14.7%
XV	217	18.6%
XVI and XVII	442	37.9%
Total	1,165	100.0%
Scholarship		
Without scholarship	129	11.1%
With scholarship	1,036	88.9%
Total	1,165	100.0%
Class of origin		
Entrepreneurs, professionals and managers	487	41.8%
Clerks	378	32.4%
Independent workers	126	10.8%
Executive employees and blue collars	154	13.2%
Total	1,145	98.3%
Current place of residence		
North of Italy	949	81.5%
Centre of Italy	134	11.5%
South of Italy and Islands (Sicilia and Sardegna)	41	3.5%
Living abroad	40	3.4%
Total	1,164	99.9%
Subject area		
Social and Humanities sciences (law, liberal-arts, sociology, psychology, economics)	398	34.2%
"Hard" sciences (natural sciences, medicine, engineering, architecture)	767	65.8%
Total	1,165	100.0%
Delayed Ph.d enrolment		
Enrolment in the Ph.d within 5 years after graduation	1,027	88.2%
Enrolment in the Ph.d after 5 years from graduation	137	11.8%
Total	1,164	99.9%
Cultural capital (parents' level of		

education)		
Primary school diploma or less	78	6.7%
First level of the secondary school or professional training	203	17.4%
Second level of secondary school (high school diploma)	454	39.0%
Graduation or more	411	35.3%
Total	1,146	98.4%
Monthly average income	1,027	88.2%
Type of Job		
Non- research job	206	17.7%
Non-academic research	185	15.9%
Professional Job	84	7.2%
Academic research	690	59.2%
Total	1,165	100.0%

In general, we based the coding on the response to question D05, assuming that academics answered by quoting their position with the same words they use in their everyday life. In this way we classified as academics all those who responded to D05 with typically academic terms such as associate professor, professor, research fellow, adjunct professor and other names of positions that relate only to the academic world. When respondents only used the generic expression “researcher” we looked at information contained in the answer to the question D06.

When this response was not sufficient to clarify academic positions (stating explicitly the university field or referring to a specific discipline in which only academic research exists, or explicitly referring to the combination of research and teaching, absent outside the University), we looked at the sector of activity of the company or institution (question D07), assuming that PhDs working in agriculture, industry and business service sectors do not work in universities. Otherwise we looked at the company or institution ownership (question D11), assuming that those working in the private or the third sector do not work in universities. In fact, the three universities considered in the survey are public institutions and only a slight minority of Italian universities is private.

To analyze occupational situation we use multinomial logistic regression, while to study monthly wages we use OLS regression. In both cases, our analysis has three steps. In the first step, the dependent variable was regressed on the individual characteristics of PhDs, or, more precisely, on their features preceding their attendance of the PhD course (see table 1):

sex, age, class of origin, cultural capital (parents' level of education), time of enrolment in the course. Familiar background variables (class of origin and cultural capital) were coded in accordance with the principle of dominance between the two parents, i.e. the highest category for occupational status and the highest level of education among both parents. The delayed PhD enrolment was coded in a dummy, distinguishing those having a difference between the age of university graduation and age at the beginning of the PhD lower than 5 years from those having this difference higher than 5 years. The latter is an indicator of investment in education to increase skills within an already started career, and consequently to increase the chance of improving this career, in a perspective of life long learning. It is therefore interesting to observe how this variable affects the probability of being employed in a certain type of job after the conclusion of the PhD course⁵.

In the second step of the analysis we added a second set of regressors related to the characteristics of the PhD course itself (see table 1). These were: the university where the course was taken; the PhD "cycle"; whether the course had been attended with a scholarship and the subject area of the course. "Cycle" is an administrative term used to indicate the year when the course was started: the first cycle, for instance, is the one that started in 1982 and finished in 1985. The subject area was recoded as a dummy where on the one hand we considered PhDs who obtained the title in social sciences and in the humanities (law, liberal arts, sociology, psychology, economics), on the other hand we considered PhDs who obtained their title in hard sciences (natural sciences, medicine, engineering, architecture). This rather crude division into two macro subject areas was technically necessary due to the concentration of cases in some disciplines, mostly natural sciences and liberal arts. For this reason we aggregated the other disciplines to these two prevalent areas⁶.

In the third step of the analysis we added, as a further regressor, the current place of residence of the PhDs. This is something that can follow in time the conclusion of the courses, and it is necessary in order to control for the effect of local labour markets on the kind of employment achieved as

⁵ We coded this variable as a dummy to avoid collinearity with the age and cycle variables, and chose 5 years as a threshold as frequencies become smaller when surpassing it.

⁶ We also estimated models with a less aggregated coding of the variable, but few effects were significant. Such models' output is available on request from the authors.

well as on the wages. Using the only information available in the dataset, namely the town of residence, we created a four-category variable distinguishing the three standard Italian macro-regions (North, Centre, South and Islands) and abroad. In this final step, to the model for wages we also added the dependent variable of the first set of models, namely the type of occupational position of the PhD graduates.

Empirical results

Type of occupation

Table 2 shows the estimates of our set of multinomial logit models, where the dependent variable is the relative probability for PhDs to be found in 2006 in one of the four types of occupations described above rather than in the other ones, with the probability to be found in a non-research job set to 0 as the reference category. In model 1 this dependent variable is regressed on a set of individual features preceding enrolment into the course. The associations (“effects”) are expressed as odds ratios (OR): an OR equal to 1 means there is no association, an OR higher than 1 means a positive association and an OR between 0 and 1 means a negative effect. All the significant associations we will comment now are robust to the introduction of additional regressors added in models 2 and 3, except when noted. The variance explained by model 1 is quite low, and few variables are significant at the conventional levels. Gender does not make a big difference. Parental background variables do not have almost any effect, confirming what is known from social stratification research: the impact of the family background on educational achievement decreases at the higher levels of schooling, at least in the frame of this kind of models. The only exception to this pattern is a positive association between having at least one parent with an university degree and the probability to be in a professional job in 2006, that we interpret as evidence of a social reproduction pattern quite relevant for professional jobs. Age has a significant negative association with the chances to be in a non-academic research job, but this is a spurious association that disappears when controlling for the doctoral cycle. Delayed enrolment is the only variable that seems to matter: it increases almost tenfold (OR=9.39) the chances to be in a professional job, doubles the chances to be in non-academic research jobs (OR=1.99) and is also associated, albeit only at the 15%

significance level, with the chances of being in academic research. This implies of course a negative association with the reference category, that is the chance to be found in non-research jobs. As delayed enrolment means accessing the PhD course in a perspective of lifelong learning, we have evidence that in our sample this perspective is not really relevant for jobs outside research and education. On the contrary, it appears to be quite relevant for the professions. However, one could suspect that in this case getting the PhD title has more to do with increasing the professional's own prestige (and the bills she charges to his customers) than her actual skills, as it was, one generation ago, with the *libera docenza* title. Something similar could hold for research-related jobs outside universities, for instance in public research institutes⁷ and in the public sector at large. This suspicion should of course be tested with more detailed data.

Model 2 adds a set of covariates related to the PhD course attended. While still low, the explained variance doubles, meaning that the characteristics of the courses are important to the occupational outcomes of the students. Concerning universities, a clear difference shows up between Trento and Milano on one side and Milano-Bicocca on the other: having been a student of the latter institution increases by a factor between 3 and 4 the chances to get a research job, both academic and non-academic, as well as a professional job, with respect to the two other. This is interesting, especially given that the model controls for composition effects due to the field of study. Concerning the latter, it is clear that from the point of view of research the PhD graduates in the hard sciences have much better occupational outcomes than those in the social sciences and in the humanities. In fact, they have more than 5 times the chances to get a non-academic research job, and about 1,5 times the chances to get an academic research job. This result could be an effect of the demand, given that in Italy there are few research positions in the humanities and the social sciences outside universities⁸.

⁷ We thank Moris Triventi for this suggestion.

⁸ As stated above, we also ran models with a more detailed, 6-categories coding of disciplines, but few effects were significant. The humanities stand out, as graduates in this field have more chances of entering a non-research job. Also, graduates in hard sciences have lower chances to get a professional job, and graduates in medicine have more chances to get a non-academic research job.

Table 2. PhD graduates occupational outcomes: multinomial logit models (N = 1,140)

Independent variables	Model 1						Model 2						Model 3					
	Non-academic research		Professional jobs		Academic research		Non-academic research		Professional jobs		Academic research		Non-academic research		Professional jobs		Academic research	
	Odds ratio	Sig.	Odds ratio	Sig.	Odds ratio	Sig.	Odds ratio	Sig.	Odds ratio	Sig.	Odds ratio	Sig.	Odds ratio	Sig.	Odds ratio	Sig.	Odds ratio	Sig.
Male	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Female	1.31	0.193	0.79	0.404	1.03	0.843	1.24	0.315	0.84	0.533	1.02	0.905	1.28	0.257	0.87	0.632	1.04	0.711
<i>Cultural capital</i>																		
Primary school diploma or less	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
First level of the secondary sch.	1.01	0.977	1.47	0.554	1.65	0.174	0.94	0.914	1.47	0.560	1.63	0.191	0.93	0.885	1.56	0.500	1.65	0.187
Second level of secondary sch.	1.25	0.607	1.44	0.570	1.24	0.539	1.27	0.590	1.48	0.541	1.30	0.473	1.21	0.677	1.52	0.512	1.28	0.501
Graduation or more	0.66	0.411	3.08	0.097	1.35	0.436	0.77	0.620	3.25	0.081	1.44	0.352	0.73	0.548	3.23	0.085	1.39	0.399
<i>Class of origin</i>																		
Entrepreneurs, professionals, .	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Clerks	1.03	0.903	0.70	0.304	0.92	0.674	0.93	0.805	0.69	0.299	0.86	0.461	0.94	0.824	0.67	0.251	0.83	0.383
Independent workers	1.11	0.789	1.97	0.213	1.57	0.164	1.09	0.828	2.03	0.193	1.68	0.117	1.11	0.806	2.00	0.204	1.65	0.128
Blue collars	1.43	0.348	1.40	0.529	1.11	0.733	1.42	0.370	1.51	0.447	1.09	0.728	1.45	0.339	1.56	0.411	1.11	0.724
<i>Age</i>	0.90	0.004	0.95	0.279	0.96	0.159	0.95	0.324	0.96	0.407	0.96	0.909	0.96	0.347	0.95	0.380	0.96	
within 5 years after graduation	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
after 5 years from graduation	1.99	0.101	9.39	0.000	1.61	0.146	1.40	0.454	8.34	0.000	1.65	0.146	1.39	0.468	3.46	0.000	1.65	0.147
<i>University</i>																		
Milano							0	-	0	-	0	-	0	-	0	-	0	-
Milano-Bicocca							3.40	0.015	3.49	0.036	4.01	0.002	3.42	0.014	3.46	0.037	3.98	0.002
Trento							1.09	0.745	1.15	0.667	1.07	0.732	1.07	0.786	1.06	0.861	1.01	0.924
<i>Subject area</i>																		
Social and Humanities sciences							0	-	0	-	0	-	0	-	0	-	0	-
"Hard" sciences							5.37	0.000	1.31	0.338	1.48	0.020	5.51	0.000	1.46	0.194	1.57	
Without scholarship							0	-	0	-	0	-	0	-	0	-	0	-
With scholarship							1.21	0.576	0.67	0.319	1.57	0.106	1.21	0.575	0.66	0.299	1.57	0.111
<i>Cycle</i>																		
From VIII to XII							0	-	0	-	0	-	0	-	0	-	0	-
XIII							1.01	0.969	0.94	0.909	0.63	0.143	0.95	0.924	0.94	0.916	0.63	0.137
XIV							1.23	0.617	0.90	0.842	0.60	0.094	1.15	0.728	0.91	0.862	0.57	0.066
XV							0.89	0.795	0.64	0.379	0.50	0.017	0.91	0.835	0.66	0.410	0.50	0.018
XVI and XVII							1.85	0.124	0.84	0.729	0.73	0.280	1.88	0.115	0.90	0.838	0.75	0.330
<i>Place of residence</i>																		
North of Italy													0	-	0	-	0	-
Centre of Italy													0.93	0.871	1.55	0.266	1.08	0.747
South of Italy or Islands													4.08	0.137	6.62	0.039	6.27	0.014
Living Abroad													2.66	0.089	0.99	0.992	1.46	0.458

Model 1: LR $\chi^2(27) = 94.01$ Prob > $\chi^2 = 0.0000$ Log likelihood = -1,207.4342 Pseudo $R^2 = 0.0375$; Model 2: LR $\chi^2(51) = 181.93$ Prob > $\chi^2 = 0.0000$ Log likelihood = -1,163.473 Pseudo $R^2 = 0.0725$; Model 3: LR $\chi^2(60) = 197.09$ Prob > $\chi^2 = 0.0000$ Log likelihood = -1,155.8956 Pseudo $R^2 = 0.0786$

Table 3. PhDs with the highest and the lowest probabilities to be found in four occupational outcomes, according to model 3 in table 2

<i>Rif.: Non-research job</i>											Non research job	Non academic research job	Professional job	Academic research job
The Highest probability	Male	Age: 35 years old	Parents' level of education: graduates	Parents are clerks	Ph.d attended at the University of Trento	Ph.d subject area: Social and humanities sciences	Enrolment in the Ph.d within 5 years after graduation	cycle XV	Ph.d attended without scholarship	Residence in the North of Italy	0.459	0.0371	0.102	0.401
The Lowest probability	Male	Age: 32 years old	Parents' level of education: first level of the secondary school	Parents are independent workers	Ph.d attended at the University of Milano-Bicocca	Ph.d subject area: Social and humanities sciences	Enrolment in the Ph.d within 5 years after graduation	cycle XVI-XVII	Ph.d attended with scholarship	Residence in the South of Italy and Islands	0.006	0.030	0.050	0.912
<i>Rif.: Non-academic research job</i>											Non academic research job	Non research job	Professional job	Academic research job
The Highest probability	Female	Age: 30 years old	Parents' level of education: second level of secondary school (high school diploma)	Parents are clerks	Ph.d attended at the University of Milano-Bicocca	Ph.d subject area: "Hard sciences"	Enrolment in the Ph.d within 5 years after graduation	cycle XVI-XVII	Ph.d attended with scholarship	Residence abroad	0.516	0.021	0.010	0.452
The Lowest probability	Male	Age: 39 years old	Parents' level of education: graduates	Parents are entrepreneurs	Ph.d attended at the University of Milano	Ph.d subject area: Social and humanities sciences	Enrolment in the Ph.d after 5 years from graduation	cycle XII	Ph.d attended with scholarship	Residence in the South of Italy and Islands	0.011	0.218	0.533	0.637
<i>Rif.: Professional job</i>											Professional job	Non research job	Non academic research job	Academic research job
The Highest probability	Male	Age: 36 years old	Parents' level of education: graduaates	Parents are entrepreneurs	Ph.d attended at the University of Milano	Ph.d subject area: "Hard sciences"	Enrolment in the Ph.d after 5 years from graduation	cycle XV	Ph.d attended without scholarship	Residence in the Centre of Italy	0.570	0.098	0.054	0.275
The Lowest probability	Female	Age: 30 years old	Parents' level of education: second level of secondary school (high school diploma)	Parents are clerks	Ph.d attended at the University of Milano-Bicocca	Ph.d subject area: "Hard sciences"	Enrolment in the Ph.d within 5 years after graduation	cycle XVI-XVII	Ph.d attended with scholarship	Residence abroad	0.010	0.021	0.516	0.452
<i>Rif.: academic research job</i>											Academic research job	Non academic research job	Professional job	Non research job
The Highest probability	Female	Age: 36 years old	Parents' level of education: first level of the secondary school	Parents are independent workers	Ph.d attended at the University of Trento	Ph.d subject area: Social and humanities sciences	Enrolment in the Ph.d within 5 years after graduation	cycle from VIII to XII	Ph.d attendet with scholarship	Residence in the South of Italy and Islands	0.918	0.018	0.040	0.022
The Lowest probability	Male	Age: 36 years old	Parents' level of education: graduated	Parents are entrepreneurs	Ph.d attended at the University of Milano	Ph.d subject area: "Hard sciences"	Enrolment in the Ph.d after 5 years from graduation	cycle XV	Ph.d attendet without scholarship	Residence in the Centre of Italy	0.275	0.054	0.570	0.098

We also suspect that the general imbalance between offer and demand of PhD graduates that was documented in section 2 is stronger for the humanities and the social sciences, but unfortunately we lack disaggregated data for this. Having had a scholarship increases the chances to have an academic research job. This could depend on two factors: first, a scholarship allows to dedicate more time to research work and guarantees better academic results; second, given that the selection process that admits students to the courses and allocates the scholarships is largely based on the networks linking candidates and professors, it could also be that professors select their preferred students for scholarships, investing on them as their future collaborators and colleagues. Looking at the cycle (see above for the precise meaning of this variable), although the significance levels is low (about 12%) there is evidence of an increase of the chances to get a non-academic research job for the more recent PhDs. Of course, those could be temporary jobs, that graduates get while waiting for an academic opportunity.

Nothing happens with the chances to get a professional job, while the recent PhD's chances to have an academic job are substantially lower than those of the eldest. This does not surprise us, given the imbalance between offer of PhDs and demand of university personnel that we have documented in section 2 above.

Model 3 adds a variable for the geographical area of residence in 2006, that we interpret as a proxy of labour market conditions. Adding it does not make a big change in the fit of the model, but some coefficients are significant and can be interpreted in a convincing way. PhDs who live abroad have more chances to get a non-academic research job, in a kind of a "brain-drain" pattern; while PhDs living in the South have more chances to get a professional or an academic job with respect to a non-academic one, be it in research or outside of it. The Southern labour market does not give to PhDs occupational chances outside the university or the professions: this was expected, considering the weak economic structure of those regions, whose industrial structure is based on public employment and tourism.

Table 3 gives our empirical evidence a less abstract form by reporting a choice of the cases who according to the prediction of our model have the highest and the lowest probabilities to be found in the four types of occupational outcomes included in the model. In other words, it includes

the individuals who more clearly impersonate the results of the model and gives something like their profile. We will not discuss it in detail, as it is just a means of presenting our results in a more explicit way for a reader not familiar with statistical models.

Wages

We look now at the wages (monthly average) that the PhDs in our sample have reported when interviewed in 2006. Table 4 reports the estimates of a set of OLS regression models constructed with the same incremental strategy used above for the analysis of their occupational situation. The first thing that has to be noted is the pattern of the explained variance. It grows abruptly going from models 1 and 2, including individual and course characteristics respectively, to model 3, including labour market conditions and type of job. This means, not surprisingly, that what matters more for the wages of the PhDs are the structural conditions of their occupations.

Model 1 shows only two regressors to have a significant association with the monthly wage of the PhDs in our sample. First, being female brings about a reduction of almost 209 euro in it, a figure quite similar to that found for Italian university graduates (Ballarino, 2006). This confirms the discrimination existing in the Italian labour market towards women, even at high levels of skill. Models 2 and 3 show that this discrimination decreases slightly when controlling for the main features of the course, of the occupation and of the local labour market conditions, but even after all this controls female PhDs are still disadvantaged by about 160 euro per month. Second, late enrolment in the course is associated with a wage premium of about 176 euro. This advantage grows larger in model 2, but becomes smaller and not significant in model 3, when the type of occupation is added to the model. This finding is to be related to the association found above between a late enrolment and the chances to get a professional or research-related job outside university, and gives more plausibility to the explanation we proposed. Family background and age do not have any significant effect on the wages.

Table 4. PhDs' monthly net wages: OLS regression (N=1,140)

	Model 1		Model 2		Model 3	
	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
Sex						
Male	0	-	0	-	0	-
Female	-208.825	0.000	-179.366	0.000	-160.047	0.000
Cultural capital (parents' level of education)						
Primary school diploma or less	0	-	0	-	0	-
First level of the secondary school	-74.317	0.495	-57.981	0.587	-45.875	0.636
Second level of secondary school	26.174	0.810	54.101	0.613	-5.523	0.955
Graduation or more	52.093	0.656	70.105	0.542	20.341	0.845
Class of origin						
Entrepreneurs, professionals and managers	0	-	0	-	0	-
Clerks	-150.547	0.012	-144.207	0.014	-108.369	0.042
Independent workers	-15.314	0.866	-0.127	0.999	23.024	0.776
Executive employees and blue collars	-38.062	0.675	-3.589	0.968	-12.916	0.873
Age	5.612	0.497	-8.122	0.389	-1.614	0.850
Delayed Ph.d enrolment						
Enrolment in the Ph.d within 5 years after grad.	0	-	0	-	0	-
Enrolment in the Ph.d after 5 years from grad.	176.379	0.050	197.428	0.035	65.026	0.454
University						
Milano			0	-	0	-
Milano-Bicocca			-0.149	0.999	35.546	0.660
Trento			91.519	0.132	115.749	0.037
Subject area						
Social and Humanities sciences (law,arts,sociology, psychology,economy)			0	-	0	-
"Hard" sciences (natural,medicine,engineering,architecture)			161.601	0.002	110.211	0.022
Scholarship						
Without scholarship			0	-	0	-
With scholarship			-369.514	0.000	-303.106	0.000
Cycle						
From VIII to XII			0	-	0	-
XIII			178.089	0.052	49.210	0.555
XIV			-79.168	0.367	-156.912	0.050
XV			-212.633	0.013	-194.502	0.013
XVI and XVII			-225.710	0.006	-234.660	0.002
Place of residence						
North of Italy					0	-
Centre of Italy					34.663	0.623
South of Italy or Islands					63.163	0.600
Abroad					1,432.549	0.000
Type of job						
Non-research job					0	-
Non-academic research job					186.753	0.017
Professional job					630.491	0.000
Academic research job					-84.152	0.161
Constant	1,229.982	0.000	1,993.553	0.000	1,843.659	0.000

Model 1: $R^2 = 0.036$ Adjusted $R^2 = 0.025$ Std. Error of the Estimate= 763.093; Model 2: $R^2 = 0.083$ Adjusted $R^2 = 0.068$ Std. Error of the Estimate= 747.276; Model 3: $R^2 = 0.256$ Adjusted $R^2 = 0.238$ Std. Error of the Estimate= 675.391

Model 2 adds, as above, the features of the course. We do not find any significant association with the university⁹, but we find, as expected, a strong association between field of study and wage, namely an advantage of about 161 euro for PhDs in the hard sciences, also in this case confirming previous results concerning wages of the university graduates in general (Ballarino, 2006)¹⁰. It is more surprising the strong negative association between wage and having had a scholarship, that declines slightly but remains strong (more than 300 euros) and significant in model 3, when the type of occupation is added. This association can depend on the fact that doctoral students without scholarship have to work while studying for their degree, and thus, when interviewed some years after graduating have more labour market experience, and thus higher wages, than their colleagues who had a scholarship. But it may also have again to do with a credentialist use of the PhD title, as a means to increase prestige and monetary returns to professionals, via some occupation-related mechanism. Unfortunately, our data do not allow disentangling the actual mechanism involved. Concerning the PhD cycle, the model shows a curvilinear pattern that, however, disappears when, in model 3, we control for the type of employment: what is left, is a negative association with the most recent cycles that is to be explained by a standard mechanism of labour market seniority.

Model 3 controls for labour market conditions (measured by the place of residence in 2006) and for the type of job. Besides the changes we discussed in the regressors already present in the previous models, we find interesting associations with both the regressors introduced. As far as the labour market is concerned, we do not find any association with the Italian macro-regions, but a very strong one with living abroad. The latter finding is not surprising: it is well-known in the labour market literature that in Italy returns to education are quite low in comparative perspective (Reyneri, 2005). The former finding is more interesting, given the income differences among individuals living in different Italian macro-regions. However, according to our sample such differences do not exist among the

⁹ In model 3, controlling for labour market conditions and type of occupation, an advantage appears for the PhDs of the University of Trento. This may have to do with local labour market opportunities not measured by our macro-regional variable (both Milan and Trento are in the North).

¹⁰ Using a more detailed, 6-categories, coding of field of study, the humanities stand out, with a monthly wage penalty of about 197 euros (controlling for all regressors).

high-level occupations that PhDs are likely to enter. In fact, wages of academics are equal by law across the country, as are those of big enterprises (where our PhDs are likely to be working when they are outside university) because of the constraints of national labour contracts. It is likely that the same holds for professionals. One should also remember that we are dealing with few individuals living in the Center and in the South (respectively 134 and 41), and that some selection effects could be at work. The same holds, of course, for the PhDs living abroad, who number just 40 in our sample. Concerning the type of occupation, we find – not surprisingly – that research jobs and non-research jobs get wages substantially lower than non-academic research jobs and, especially, of professional jobs. In fact, the monthly wage premium to a PhD in a professional job, with respect to one working in the university, is higher than 700 euro.

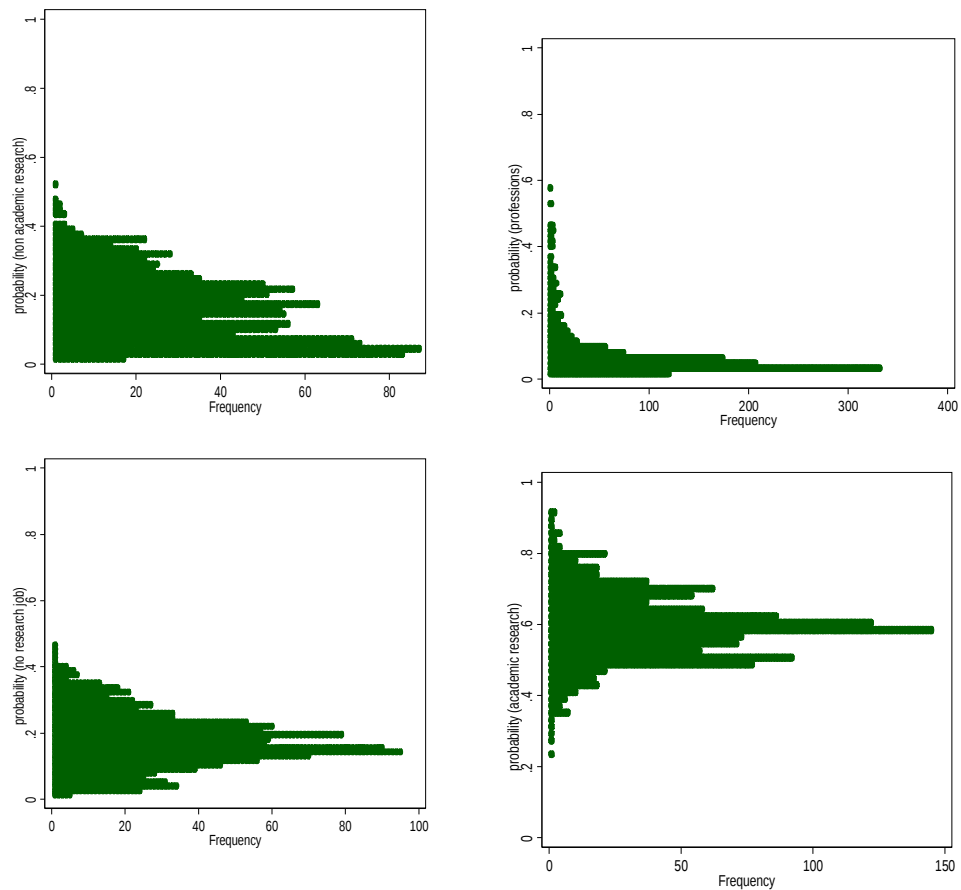
Discussion and conclusions

Despite the strong limitations of the data we used, this paper provides evidence that can be of some use to those with an interest in the occupational situation of the PhD graduates in Italy. Table 5 and figure 3 give a synthetic outlook of the occupational patterns of the PhDs of our sample showing the predicted probabilities produced by our multinomial logit model (model 3 in table 2). The model controls for the main features of the individuals, of the PhD course they graduated from and of the labour market they are inserted in at the time of the survey.

Table 5 – Descriptive statistics of the predicted probabilities to be found in four occupational outcomes, according to model 3 in table 2 (N=1,140)

	Mean	Std.Dev	Min	Max
Non-research job	0.17	0.08	0.006	0.459
Non-academic research job	0.15	0.10	0.010	0.516
Professional job	0.07	0.07	0.010	0.570
Academic research job	0.59	0.09	0.237	0.918

Figure 3. Distribution of the predicted probabilities of doing a non-research job, a non-academic research job, a professional job or an academic research job



It is clear that university largely remains the main occupational outcome, with a mean probability of 59%, while a non-research job has a mean probability of 17% and a non-academic research job a probability of 15%. If we want to give Italian PhDs occupational chances “beyond research and education”, as the Leru document proposes, there is still a

long way to go. However, our evidence confirms the relevance of the Leru's proposal is relevant, as for the PhDs from the more recent cohorts it is increasingly difficult to get an academic job. This is an effect of the imbalance between supply and demand of PhDs determined by the great expansion of enrolment in this kind of courses since the start of the 2000s. We also found evidence that this imbalance varies across fields of studies. The PhDs in hard sciences, including engineering, have more chances to get a research job both inside and outside universities and, also controlling for the different type of occupation achieved; they get a substantial wage premium with respect to PhDs in the humanities and the social sciences. This pattern is important from a policy point of view and we think it should be taken into account if policy-makers should want to intervene on the supply side of the imbalance, by reducing the number of PhDs awarded. This reduction should be selective, given such different occupational outcomes.

Besides this main argument, our empirical analysis of the occupational outcomes of the PhDs gives some other interesting indications that can be related to it. First, there is evidence of the survival of a credentialist use of the PhD title outside universities. According to our sample, more than 10% of the PhD students enrol more than 5 years after graduation, when they are already working in the professions or in non-academic research positions in the public sector. Then, the title gives them the possibility to increase their professional prestige and their wage. This is the same kind of behaviour that brought to the abolishment of its historical predecessor, the *libera docenza* title. Of course, this pattern seems to be something quite different from the lifelong learning perspective that is normally associated with access to graduate studies some time after the first level university degree. In the case of the professionals there is also some evidence of social reproduction, as the cultural capital of the family of origin is positively associated with this occupational outcome.

Second, we found that having a scholarship is positively associated with the chances to get an academic job, while it is strongly negatively associated with wages after graduation. It has to be noted that only about 11% of the PhDs in our sample had enrolled to the course without scholarship, as many of them had accessed the course before the regulations changed and made it easier to enter it without scholarship. It would be interesting to see what is happening on the labour market with the

much higher proportion of PhD students without scholarship that have achieved the title since then: when few students accessed the course without scholarship, they were likely to be strongly selected on motivation, while this should not happen since their numbers increased.

Third, despite our sample includes only universities located in Northern Italy, we found some interesting geographical patterns in the occupational outcomes of the PhDs. First, we found that doctors living in the South have substantially less chances to get a job outside research, both academic and non-academic. Second, we found that the wages of the PhDs do not change across macro-regions, despite the strong geographical variation in the labour market conditions that characterizes Italy. This results could be due to selection effects, given that they are likely to be generated by Southern students who moved from the South to get a PhD in the North and then went back home to find a job, a population probably self-selected on motivation and familiar resources. However, they point to a strong geographical variation of the occupational conditions of Italian PhDs that should be investigated more, especially from a policy-making point of view.

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