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The impact of CIFRE programme into early careers of PhD graduates in France

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ABSTRACT

The queue for permanent research positions in the French academic sector has created a specific labour market for PhD graduates, characterised by a proliferation of post-doctoral programmes and public fixed-term contracts. At the same time, we observe an increasing proportion of young PhD graduates employed in the private sector, three years after graduation. In order to facilitate the transition of PhD graduates to the private sector, the Ministry of Research has developed a specific programme called CIFRE during the PhD, associating universities and firms. Our research focuses on the evaluation of this programme. More precisely, we try to assess their impact on the subsequent wage earned three year after the PhD graduation using a treatment effects method based on propensity score matching estimator. We use a longitudinal survey provided by the Céreq in 1999. Our results suggest some evidence of positive returns for the CIFRE programme.

KEYWORDS

PhD labor market, Matching estimators, Public policy toward science, CIFRE programme

JEL CLASSIFICATION

J24, J41

SOMMAIRE

1. INTRODUCTION

The French academic system yields around 10 000 PhD per year, so that France is among countries which have a huge number of young PhD. Comparatively, Europe has 68 000 new PhD each year and USA more than 40 000 (Nsf, 2002). Young PhD, being the main producers of knowledge, are mainly employed in the public sector for research (Béret, Giret and Recotillet, 2004), however, for a while, they are attracted to the private sector.

One of the major transformations of doctoral training occurring during the last decade is the multiplication of the links between the academic sector and the R&D sector (Beltramo, Paul and Perret, 2001), encouraged by the new orientations of the public policy of the public sector for research. Since the mid-nineties, the papers dealing with the analysis of job opportunities for young doctorates show an increasing proportion of them employed in the private sector (Béret, Giret and Recotillet, 2003 ; Martinelli and Molinari, 2000). Young scientists, especially those with degrees in mechanics, engineering sciences or computer science, are more and more attracted to the private sector and less and less to academic careers.

The organisation of research is a powerful factor structuring the labour market for recent doctorate recipients. Since the beginning of the eighties, the Ministry of Research have developed specific grant called CIFRE[1] during the PhD, associating Universities and firms in order to train young graduates more adapted to the needs of the private firms. More precisely, the National Association for Technology Research (ANRT), which is attached to the Ministry of Research and Technology, supports for a three year period a firm hiring a young PhD-candidate associated with an external lab[2]. The student spends time between the two partners and can also contribute to technology transfer although the thesis topic is usually a problem of direct concern to the industrial partner.

In that specific context, our paper addresses two questions: how the young PhD students get a CIFRE contract and how does it pay off. Since the selection into CIFRE contract is not random, one can apply methods which are used for the evaluation of active labor market programmes. Our research seeks to address these issues by examining the consequences of a CIFRE for a nationally representative sample of PhD graduated in exact sciences and human and social sciences in 1996 and surveyed in 1999, three years after PhD graduation.

The paper is organized as follows. The next section reviews some theoretical considerations on the regulation of labor market for young scientists in France. Section 3 exposes the econometric framework of our evaluation analysis. Section 4 presents the Céreq survey and some statistics of the data which addresses a first overview of the transition of PhD graduate in France. Section 5 presents the main results obtained from different econometric methods. Finally, section 6 discusses some implications of our findings.

[1] CIFRE : Convention industrielle de formation par la recherche or Industrial Agreement for Training Through Research. Since 1990, 600 CIFRE contracts have been created each year.

[2] During the three years of the agreement, the company pays an annual gross wage of 20,000 euro or more.

2. THE CHANGING CHARACTERISTICS OF THE FRENCH LABOR MARKET FOR PHD GRADUATES: A REVIEW OF PREVIOUS STUDIES

Recent improvements in the data available about the doctorates' labor market have given rise to a growing body of literature. If a considerable amount of papers has been written concerning the cooperation between university research and scientific activity in industry, little has been written considering the impact technology transfer has in doctorates careers. As Stephan (2001) points out, technology transfer may have direct and indirect education implications for PhD students. Indirectly, faculty may affect the curriculum by initiating new program or updating training. Directly, technology transfers offer the possibility of linking students to industry more efficiently, by providing opportunities for industries and students to meet (Stephan, 2001, p.201). However, she noted that technology transfers have the potential to have negative impacts on students by changing the nature of the relationship between faculty and student. This seems to be the case for the US biomedical research where private funding may divert them from their academic research without completion of their degree.

In France, the organization of research and development within companies seems to generate a particular situation for the recruitment with competition between the elite engineering schools graduates and the PhD graduates. As noted in Beltramo, Paul and Perret (2001), several factors may explain the large percentage of industrial researchers recruited from shorter degrees than a PhD, whereas the latter is the minimum level required for academic research. Firstly, the internal cooperation inside the firm between R&D and the other functions explains that engineering graduates are more efficient in maintaining links with production due to the tacit knowledge exchanged during the process and the advantages gained by a "common culture". Secondly, the reduction of R&D costs of producing in line with an externalisation of R&D, may lead to a decrease in the demand of PhD graduates without reducing the possibility of being able to assimilate outside information and scientific knowledge (Beltramo, Paul and Perret ; 2001, p.822). Furthermore, their cases studies show that if the company adopt a career path where researcher may access high positions outside the R&D activity, it gives preference to the recruitment of engineering graduates, who are more adaptable and mobile than PhD graduates. So, as Béret (2002) noted, the proportion of PhD among industrial researchers is not increasing in France while the proportion of master degrees is the most important part of the population of industrial researchers.

The queue for permanent research positions in the French academic labor market (Martinelli and Molinari, 2000, Mangematin, 2001, Robin and Cahuzac, 2003 ; Béret and alii, 2004) has created a specific labor market for young doctorates, characterised by a proliferation of post-doctoral programmes and fixed-term contracts financed by research contracts immediately after the PhD graduation. In the public academic sector, recruitment for permanent job depends on the opportunities to placement which are less frequent than the job offers. One of the characteristics of the French academic labor market, the life-long employment directly following graduation to those who have reached the rank of assistant professor at university or researcher in a public research organisation is less and less frequent: only 10% of PhD graduates in 1998 (Béret and alii, 2003). In the same way, three years after graduation, all the studies that analyse job opportunities for young doctorates show a decreasing proportion of them employed in the public academic sector (Béret, Giret and Recotillet, 2004; Martinelli and Molinari, 2000). So, the public research policy try to direct a more important flow of PhD to the private sector.

However, PhD graduates possessing a particular set of characteristics may be considered desirable for some jobs in the academic sector and at the same time, undesirable for the others in the private sector (too qualified or specialized, too far from firm culture or too old…). As Romer (2000) pointed out, highlighting the difficulties of PhD graduates in the US labor market requires to distinguish between people who are trained exclusively for employment in public research and universities and people who may work in research and development in the private-for-profit sector. Different observations suggest that PhD graduates in France have a strong preference for academia, which leads many graduates to accept temporary jobs in the public academic sector. Robin (2003) reports that this preference for academia may be considered as a negative signal for private employers: he shows very clearly that the number of publications for PhD graduated in life sciences reduces the transition rate to the private sector.

In this context, several reasons may explain a positive advantage of the CIFRE program in the PhD labor market and specially, in the private labor market.

From a very general point of view, offering a fixed term contract is a mean to observe the individual research productivity and the quality of a match. For highly skilled workers, especially PhD graduates, employers have an incomplete information on the ability of applicants. CIFRE contracts, with their short tenure, provide considerable flexibility to the recruitment and may reduce the asymmetric information on the ability. During the three years of the programme, the general abilities and academic knowledge of the PhD student may be tested in the industrial setting. In addition, it is a mean to observe organizational skills (aptitude for team work, creativity, critical thinking…) which can be considered as essential attributes for research activity in the R&D functions (Verdier, 2001).

Another point is to know whether the potential productivity of PhD graduates employed in CIFRE programme gives an advantage and a better position on the labor market. PhD students during the three years of the CIFRE program often work in the R&D department of the company whose recruit them[3]. They may receive on-the-job training that is specific to the firm or to a particular job, which makes them more valuable to the employer providing the training, but also, to the other employers. Drawing on empirical evidence from cases studies carried out in large multi-national high technology firm in Britain, Lam (2001) shows that skills requirement for the new innovation context are now more demanding in multiple dimensions particularly in the combination of technical disciplinary expertise with a broad of range of business, management and social skills. The problem is that company can not afford the time for the training and the integration of graduates with no practical experience. One solution is the creation of new intermediation spaces between academia and industry, whose purpose is to facilitate the co-production and transfer of competences (Lanciano, Nohara, 2003) and to increase the suitability of PhD graduates to the private labor market. One form of the cooperation, developed within this framework, is the CIFRE programme in France: during the three years of the PhD, employers support only a part of the wage and may invest in transferable training.

[3] There is no explicit rule about the work location of PhD students with a CIFRE program. However observation shows that they spend more time in the firm than in the laboratory.

3. ECONOMETRIC APPROACH: A NON PARAMETRIC MATCHING ESTIMATOR

In this section, we try to assess the impact of a CIFRE programme on the subsequent wage earned after the PhD graduation. In that sense, we need to turn to the econometric evaluation literature, widely developed on that topic for twenty or so years (see for example the huge number of papers published by Heckman on that topic) and to refer to studies on treatment effects (Heckman, Ichimura and Todd, 1997, 1998). We are interested here in the impact of a treatment T_1 (to beneficiate from a CIFRE program) in comparison to the non-treatment situation T_0 on a targeted outcome, the wage earned for those employed in the private sector 3 years after graduation. The well known problem that arises in that typical evaluation exercise is the bias due to the use of a non randomised sample. To overcome to this problem, a vast literature on statistical non parametric matching estimator has been developed in the last ten years (Heckman, Ichimura and Todd, 1997, 1998; Becker and Ichino, 2002; Dehejia and Wahba, 1999, 2002…) following the publication of Rosenbaum and Robin in 1983.

The aim of these methods is to obtain an average treatment effect as if experimental data were used for computation and is given by the following difference:

$$E(W_1 \mid T = 1) - E(W_0 \mid T = 1) \qquad [1]$$

That means ones needs to construct from the population of interest a control group and a treated group. However we do not observe W_0, the outcome of interest the participants would have had if they have not participated. This not observed outcome is the so-called counterfactual expectation, $E(W_0 \mid T = 1)$. Because the counterfactual is by construction unobservable, we need to estimate it on the basis of the observable expectations, $E(W_1 \mid T = 1)$ and $E(W_0 \mid T = 0)$. In other words, we prone to use a non parametric matching estimator which consist of establish a control group for the non treated such that the control is very closed to the treated group according to the vector X of observable characteristics. From a statistical point of view, it implies that: $W_0 \perp T \mid X$, so that the treatment effect of the treated is the difference between the wage expectation in the control and treated groups.

Since the matching procedure requires that the two groups are elaborated conditionally on the X's, one should find two distinctive groups for which the X's are the same. In so doing, the method is inappropriate and the use of a propensity score obtained from a Logit or Probit estimation overcome the problem. This allows us to get a unique number for each set of similar X's. And, as Rosenbaum and Robin pointed out, for the same propensity score in the two groups, one get the same distribution of the entire vector X independently of the treatment. This is the so-called balancing property of the propensity score and its guarantees that the construction of the two groups is random. Furthermore, the computation of the propensity score might be restricted to the common support of the X's, so that the computation is restricted to units for which the value of the X overlaps for the treated and control groups. At this stage, it is still not possible to implement the non parametric matching estimator. Actually, as the probability to observe two individuals with the same propensity score is closed to zero, we need to make use of complementary methods (for details, see Becker and Ichino (2002) or Dehejia and Wehba (1999)). Two methods are in use in this paper, the nearest neighbour method and the kernel method, which seems to have the best properties (Heckman, Ichimura and Tood, 1998; Hirano, Imbens and Ridder, 2000). Briefly, the nearest neighbour is based on finding the units for which the propensity score is the closest. The Kernel method allows us to smoothen the split into several intervals in taking

weighted average conversely proportional to the distance between the propensity score of the two groups. We implement the Mahanalobis metric matching in order to add some relevant dimensions besides the propensity score estimation, which is called the balancing score (Rosenbaum and Rubin, 1983). This method is a way to reduce the selection bias.

4. DATA AND SAMPLE

The study uses data from the " Survey on the Destination of Leavers from Higher Education", a sample of 10 000 individuals having left the French educational system in 1996 and interviewed in 1999, carried out for the Céreq. The survey includes useful information on young people characteristics (family 's socioeconomic status, age, highest grade completed, highest grade attended, university area, job…) and work history since 1996 until 1999. Of the 10 000 school leavers, we reduce the sample to 1744 respondents leaving higher education with a PhD. This sample is nationally representative of French PhD awarded in exact science, human and social science. Data are also available for two other cohorts, those graduated in 1994 and 1998. However, for the first cohort, the sample size did not allow a detailed analysis by field level. Moreover, only the database for those graduated in 1996, provides detailed information on doctoral conditions for PhD students (financial support, research institution, duration of the PhD…).

Table 1 shows the occupational allocation of doctorates for the three cohorts, three years after graduation, in the public sector, in the academic public sector and in the R&D sector. We can observe that the part of graduates employed in the public sector fall dramatically since 1997: for the last cohort, less than one graduate on two is recruited in the public sector. The decrease of the part of employment in the public academic sector mainly explains the general fall of the employment in the public sector. This pattern is likely to reflect more restricted access to job recruitment in the public research sector, in CNRS or higher education than in the middle of the nineties (for example, see Bideault and Rossi, 2003). However, contrary to what may be expected, the proportion of PhD in the R&D private sector did not increase in the same proportion, except for those who completed an engineering schools before their PhD or who were graduated in mechanics, engineering sciences or computer science. As highlighted in table 1, differences exists by discipline levels. Generally, the recruitment in public sector, notably in the academic sector is still important for PhD graduates in social and human science: in 1999, the majority is employed in the public academic sector whereas only one third of graduates in exact science is in this sector.

As Stephan and Levin (2001) pointed out, the first three or so years, following the end of the PhD are critical to the scientist level and the career of young doctorates. For the French PhD graduated in 1999, our data allows us to identify precisely the early career stages for those beneficiating from a CIFRE program and the others. Table 2 shows the proportion of PhD graduates with a first temporary research job following the PhD Graduates. As can been seen, about 44% found a temporary job but only 28% of the CIFRE PhD. Three years later, 28% are still in a temporary job but 9% for CIFRE PhD. In addition, the observation of the earnings distribution clearly show that earnings are higher for CIFRE PhD graduates, which may be explained by a more frequent recruitment in the private sector.

Table 1

Occupation position three years after graduation (%)

	Part of graduates employed in the public sector			Part of graduates employed in the public academic sector			Part of graduates employed in the private R&D sector		
Cohorts	1997	1999	2001	1997	1999	2001	1997	1999	2001
PhD graduates	66	61	53	51	50	40	15	16	18
PhD graduates in exact sciences	61	54	47	48	47	35	18	22	24
PhD graduates in human and social sciences	85	76	70	64	57	53	1	2	1

Céreq, PhD graduated in 1994, 1996, 1998 and surveyed in 1997, 1999, 2001.

Table 2

Job mobility after a first temporary job in the public research sector

	All the Phd graduates	PhD with a Cifre programme
Part of graduates with a first temporary job	44%	22%
Part of graduates with a temporary job, 3 years after graduation	23%	9%
Unemployment duration before the first job (in months)	2.9	2.8
Part of graduates employed in the private sector	39%	80%
Net earnings, 3 years after graduation		
First quartile	1.680 €	1.830 €
PhD with public financial support	1.875 €	2.160 €
PhD without specific financial support	2.290 €	2.440 €

Céreq, Ph graduated in 1996 and surveyed in 1999

5. RESULTS

5.1. Estimation of propensity score

We present in this section the determinants of having a CIFRE during the PhD by estimating a probit model, which are used for the estimation of the propensity score. Previous work carried out on young PhD careers suggest several variables in relation with the education background that should be included in a model estimating the propensity to attend a CIFRE program during the PhD: PhD area, last diploma awarded before the PhD, research institution…

We estimate propensity scores by running probit regression on a set of observed covariates, all known or hypothesized to be related to public contract attendance. The area structure is captured by five dummy variables : humanities, economics and laws, mathematics and physics, engineering, chemical and biological sciences. As mentioned above, another important variable is the research institution in which Phd thesis has been carried on : it can

be a CNRS[4] team (or university-CNRS mixed unity), an university team or another institution. In addition to the usual individual characteristics such as gender, age, parents socio-economic status, location, a variable controlling for past educational diploma is included : having only an engineering school or a business school diploma (Grandes écoles), only an universitary degree or both. It has been demonstrated that students with a degree from an engineering school tend to be largely attracted by the private R/D Firms (Beret, 2002 ; Giret and al., 2003). Finally, to reflect the heterogeneity of the academic ability before the access to the PhD, we include a proxy of the schooling delay corresponding to the starting date of the PhD minus the entry date in higher education.

Table 3 presents the results of the probit equation concerning the probability of finding a CIFRE contract. The fields of study have a very strong impact : PhD in engineering or in chemical science is associated with a higher likelihood of being selected, that may be explained, in part, by the public will to help some industrial sectors. On the contrary, it is more difficult for students in humanities or in laws and economics. Results also show that the pre-doctoral training is a very significant predictor : students in "Grandes écoles" are more likely to find a CIFRE than university students. In addition, there are significant differences between the research institution in which Phd thesis has been carried on : CNRS laboratory, where the research is more fundamental, has a negative effect on the likelihood to find a CIFRE. With regard to the student location, it appears that it is easier for student to find a CIFRE in a region where the density of R&D companies are higher.

Table 3
Probit Equation : a CIFRE contract

	Coefficient	Std Errors
Constant	-0.97***	0.12
Gender		
Male	0.06	0.08
Field of study		
Natural science	*Ref*	
Engineering	0.38***	0.12
Mathematics, Physics	-0.11	0.13
Chemical science	0.35**	0.14
Law, Economics	-0.33**	0.16
Humanities	-1.15***	0.23
Study delay before the PhD		
No delay or one year	*Ref*	
More than one year	-0.14	0.19
Research institution during the PhD		
Other institution (Inra, Inserm…)	*Ref*	*ref*
CNRS or Mixed Unity Research (CNRS-University)	-0.35***	0.10
University team	-0.02	0.10
Pre-doctoral training		
Only in university	*Ref*	
Only or mainly in engineering school or business school	1.06***	0.25
In university and engineering school	0.77***	0.12
Regional density of R&D firms	-0.10***	0.003
Log Likelihood: –551,81		

Note : *** 1%, ** 5%, * 10%, levels of significance.

[4] National Center for Research.

5.2. Average treatment effects

In this section, we estimate the average treatment effect of having benefiting of a CIFRE programme during the PhD (table 5). We proceed to the estimations using successively a standard OLS regression, a two stage estimation for endogenous treatment and two types of matching estimators.

An important variable which may be a consequence of finding a CIFRE contract is the employer sector three year after graduation. As we show in table 1, PhD graduates with this first contract are more likely to be in the public sector, three years later. However, wages in the public sector are generally lower for PhD graduates (Martinelli et Molinari, 1999). In order to solve this problem, we propose two ways. Firstly, the variable is omitted from the probit regression and is included in the balancing score of the matching estimator and in the earning function of the parametric approach. Secondly, we can restrict the sample to PhD graduate who have job in the private sector, which may introduce a new bias in our analysis.

In running OLS standard regression, we suspected an endogenous effect of having being treated. As a matter of fact, the ATT from the OLS regression is positive and significant, implying that having been recruited on a CIFRE contract in the public sector has a positive effect on the wage earned afterwards. Once controlled for relevant characteristics and using a matching estimator, the positive average treatment effect is still significant for the Kernel method. Even if the Kernel weights are without doubt more relevant than the neighbour matching, the Mahanolobis matching seems to be more appropriate to address our economic issues. Actually, the Kernel estimation does not take into account an important variable indicating whether the job three years after graduation is in the public sector or in the private sector. Once this variable is added in the balancing score using the Mahanolobis method, the effect is still significant and positive. If we restrict the sample to PhD graduates who have job in the private sector, the results are the same. Young people having benefited from CIFRE should also easily value their doctoral experience and then obtain greater wages. We could explain this positive effect by assuming that CIFRE financial support reduces the uncertainty for the firms recruiting doctorates holders and increases their suitability to the requirements of the private sector.

Table 4
Average treatment effects of CIFRE temporary contract during the PhD

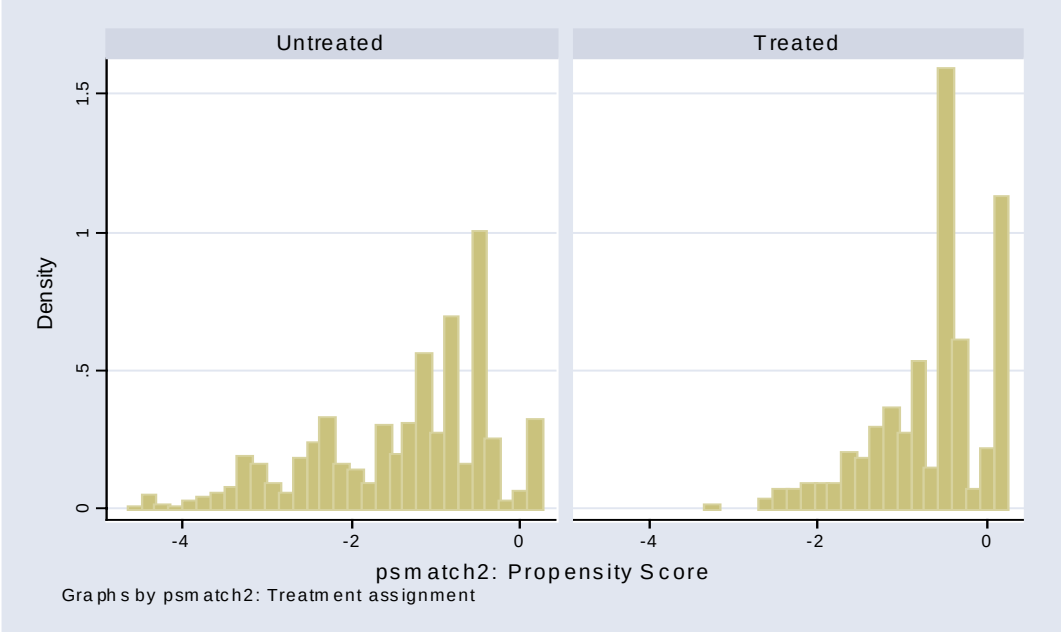
	Method	ATT	t-value (with bootstrapped S.E.)
Job held in the Private or in the Public sector			
	OLS	0.07	3.0***
	2-step	0.27	3.74***
Xβ	Kernel	347.35	2.79***
Xβ	Mahanalobis	278.19	1.95*
Xβ,public	Mahanalobis	256.39	1.84*
Job held in the Private sector			
	OLS	0.09	2.65***
	2-step	0.33	2.51***
Xβ	Kernel	315.32	1.90*
Job held in the private RD sector			
	OLS	0.03	0.73
	2-step	0.05	0.67
Xβ	Kernel	352.22	0.87

Quality matching

In table 5 and 6, a test of the bias of the observed characteristics before matching and after matching[5] within the treated and untreated sample is performed – based on the Mahanalobis or on the Kernel matching -, following Rosenbaum and Rubin (1985). The calculated bias is the difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups.

It is clear that as regards to the bias and t-test columns, the bias is not only reduced but become insignificant. Then there are important differences before matching between the treated group and the untreated group. Differences exist also in the distribution of the propensity score as the Figure 1 indicates. In the treated sample, the distribution of the propensity score is more skewed to the right.

Figure 1
Propensity score distribution for the treated and untreated group



After matching, these differences have been erased, especially for the propensity score variable, whom bias is reduced from 83.8% to 1% in table 3 for instance.

[5] The test have been implemented on the full sample, that means containing jobs in the public and in the private sector.

Table 5

Balancing of covariates : test of bias before and after matching estimations

Mahanalobis		Before matching				After matching			
		Treated	Untreated	Bias %	t-test (|t|)	Treated	Untreated	Bias %	t-test (|t|)
Propensity score		-0.76	-1.75	95.8	13.51	-0.78	-0.79	0.9	0.12
Wage		2505.6	2151.2	17.6	2.08	2353	2024.6	18.5	2.32
Gender	Male	0.68	0.60	15.0	1.63				
Field	Natural sciences	0.38	0.18	46.5	5.23	0.34	0.35	-1.8	0.18
	Chemistry	0.20	0.19	2.0	0.22	0.19	0.18	2.1	0.22
	Mathematics	0.15	0.20	-13.1	1.42	0.15	0.15	-1.0	0.12
	Humanities	0.02	0.08	-29.2	2.99	0.02	0.02	0.0	0.0
	Economics	0.06	0.11	-19.1	2.03	0.08	0.08	0.0	0.0
Place of thesis	University	0.19	0.17	4.9	0.5	0.20	0.19	2.7	0.32
	CNRS	0.44	0.51	-14.4	1.57	0.44	0.44	0.0	0.0
Past education	Mainly University	0.05	0.01	21.5	2.5	0.07	0.07	0.0	0.0
	Only University	0.31	0.9	60.9	7.05	0.28	0.26	2.0	0.19
Not late in the higher education system		0.05	0.05	0.7	0.08	0.05	0.05	0.0	0.0
Born abroad		0.11	0.10	2.2	0.24	0.11	0.08	9.3	1.15
Density of RD activities		20.92	20.05	7.3	0.80	20.40	19.65	6.2	0.71
Job in the public sector		0.28	0.67	-86.9	12.46	0.28	0.28	0.0	0.0

Note : The bias is the difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (formulae from Rosenbaum and Rubin, 1985)

Table 6

Balancing of covariates : test of bias before and after matching estimations, the CIFRE case

Kernel		Before matching				After matching			
		Treated	Untreated	Bias %	t-test (|t|)	Treated	Untreated	Bias %	t-test (|t|)
Propensity score		-0.76	-1.75	95.8	13.51	-0.76	-0.78	1.8	0.34
Wage		2505.6	2151.2	17.6	2.08	2505.6	2192.5	15.6	1.8
Gender	Male	0.68	0.60	15.0	1.63	0.68	0.65	5.3	0.60
Field	Natural sciences	0.38	0.18	46.5	5.23	0.38	0.39	-1.6	0.16
	Chemistry	0.20	0.19	2.0	0.22	0.20	0.19	0.8	0.09
	Mathematics	0.15	0.20	-13.1	1.42	0.15	0.15	-1.5	0.18
	Humanities	0.02	0.08	-29.2	2.99	0.02	0.02	-2.3	0.40
	Economics	0.06	0.11	-19.1	2.03	0.06	0.07	-1.6	0.21
Place of thesis	University	0.19	0.17	4.9	0.5	0.19	0.19	0.6	0.07
	CNRS	0.44	0.51	-14.4	1.57	0.44	0.43	1.5	0.17
Past education	Mainly University	0.05	0.01	21.5	2.5	0.05	0.07	-9.4	0.79
	Only University	0.31	0.9	60.9	7.05	0.31	0.29	4.2	0.39
Not late in the higher education system		0.05	0.05	0.7	0.08	0.05	0.06	-2.9	0.31
Born abroad		0.11	0.10	2.2	0.24	0.11	0.09	4.3	0.49
Density of RD activities		20.92	20.05	7.3	0.80	20.92	21.25	-2.7	0.30
Job in the public sector		0.28	0.67	-86.9	12.46	0.27	0.61	-73.1	12.44

6. CONCLUDING REMARKS

As we pointed out in the introduction of the paper, few papers have been devoted to labour market for young scientists in France and especially on the particular topic of the evaluation of specific programs. The specific patterns of transition from school to work for young PhD associated to a very singular organization of public research in France had created a narrow labour market for research. However, for a while, the public sector for research is no more the principal employer of young doctorates in exact sciences, whereas in human and social sciences, the recruitments in the public sector are still the most frequent, although we observe a slight decrease. The transformation of job opportunities for young scientists is accompanied by the public policy for research which encourages the development of links between universities and firms.

Our knowledge of career paths for young doctorates is rather limited, at least in France and this paper attempts to improve the empirical knowledge on that topic. Our survey shows that that if one third of the PhD graduates has a direct access to jobs in the research sector (28% in the private or 8% in the public sector), 28% get a temporary labor contract in the public research sector immediately after graduation. In the econometric analysis, we seek to assess the impact of having a CIFRE programme during the PhD on the subsequent wage, three year after graduation. Using a non parametric matching estimator to control for the selection bias due to the choice of a CIFRE programme, we show that there is a positive wage gain, three years after graduation, especially in the private sector. It also appears that implying simultaneously universities and firms in the doctoral training has a positive impact for young doctorates in the early stages of their careers.

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