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David N. Margolis
Paris School of Economics, CNRS and IZA

Luis Miotti
CEPN-CNRS, Université Paris 13

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IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Why Do French Engineers Find Stable Jobs Faster than PhDs?*

This paper studies why PhDs in France take longer to find stable jobs than engineers. Using data from CEREQ's "Génération 2004" survey, we show that job finding rates of PhDs are lower than those of engineers and document the differences in their observable characteristics and fields of study. We show that this phenomenon is due to multiple factors: heterogeneity in student characteristics along observable (but not unobservable) dimensions and fields of study, directed search toward public sector positions (especially professors) among PhDs and reservation wages of PhDs for private sector jobs that are "too high" relative to their value of marginal product.

JEL Classification: J24, I23, J64

Keywords: school-to-work transition, STEM, directed search, wage subsidies

Corresponding author:
David N. Margolis
Paris School of Economics
48 boulevard Jourdan
75014 Paris
France

E-mail: David.N.Margolis@gmail.com

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1 Introduction

France's higher education system faces a paradox. Students who graduate with PhDs take longer to find stable employment, defined as an indefinite-term contract or civil service position, than those who graduate with an engineering degree, despite having more years of schooling (PhDs leave school at age 28.7 on average, engineers at age 23.9) and thus (in principle) more human capital[1]. This effect applies not only for PhDs as a whole, but also when restricting attention to PhDs who obtain their degrees in the same fields as engineers. Even more surprisingly, students who complement their engineering degree with a PhD still take longer to find stable employment than those who stop after obtaining their engineering degree and start looking for a job immediately. If human capital is increasing with education (Becker, 1993; Mincer, 1974), PhDs should be at least as productive, if not more productive, than engineers and thus more attractive to employers all else equal. So why do they take longer to get settled into the job market?

This paper examines several possible explanations for the paradox of a relatively slow transition of PhDs to stable employment. Using data from the Génération 2004 survey[2], we suggest and test several alternatives. First, we consider the "all else equal" hypothesis by focusing on differences among observable characteristics of graduates (grades, age, sex, region, parental background). We then explore the content of the human capital acquired by comparing the distribution of fields of study among engineers and PhDs. We then consider the possibility of directed search (Wright et al., 2017), in which PhDs and engineers target different types of jobs. Next, we consider the possibility that PhDs have reservation wages that exceed their value of marginal product, and use the reform of a wage subsidy that targets PhDs to asses its importance. Finally, we examine the possibility that unobserved heterogeneity affects the speed of finding a stable job, and consider the endogeneity of education with respect the rate of being hired for a stable job.

From a methodological point of view, we model the time until stable employment using semi-parametric and parametric proportional hazard duration models. These models are particularly well adapted to this question because 38.4% of individuals in the sample have not found a stable job before the end of the sample window (between 3 and 5 years after school leaving), and the number grows to 93% when focusing only on private sector research and development (R & D) positions, excluding professors. Duration models also allow us to separately consider the roles of observed and unobserved heterogeneity versus time dependence in determining the

[1]See Margolis and Miotti (2015) for details.

[2]Génération 2004 is a survey run by the Center for Studies and Research on Qualifications (CEREQ) that samples individuals from the cohort of students who left school in 2004 without subsequently returning (Aliaga et al., 2010). Relative to the other Génération surveys, the 2004 cohort is unique in that it is the only one for which data was collected not only on the highest degree obtained, but also on degrees obtained prior to the highest degree, which allows us to identify students who followed up an engineering degree with a doctorate.

speed of job finding for the different types of graduates.

It is worth noting that this paper focuses only on the time to the first stable job and not other characteristics of the school-to-work transition. As such, it does not claim that a job search process that involves a series of unstable jobs that lead to a stable job (e.g. several post-doctoral or temporary teaching positions en route to a tenured teaching position) is inferior to a process by which a stable, but perhaps less appealing, job is found sooner. We also do not examine the earnings, career progression or working conditions of the jobs found, although we do consider whether the job is an R & D position or not. We do not claim that any particular actor is behaving in an individually suboptimal way, although the equilibrium outcome of having PhDs spend several years before settling into a stable job while engineers make the same transition more rapidly may be considered socially suboptimal. In this sense, our analysis can be considered as providing insight into one component, albeit a particularly important component, of the school-to-work transition.

Our results suggest that each of the proposed explanations for the slower rate of transition to stable employment of PhDs relative to engineers finds some empirical support. Directed search, in particular a focus on R & D positions - especially professors - and the public sector, is a major contributor to the difference in overall stable job finding rates. We find support for excessive reservation wages as well, in that a sufficiently large wage subsidy appears to be able to induce employers to hire certain doctors more rapidly than comparable engineers. We also find that differences in the composition of the pool of engineers versus PhDs matters, along the lines of subjects studied and observable individual characteristics.

The rest of this paper is organized as follows. The next section rapidly describes the differences in observable characteristics and fields between engineers and three different types of PhDs: PhDs who already have an engineering degree, PhDs without an engineering degree but who study the same fields for doctoral study as those chosen by engineers who continue on to complete a PhD, and PhDs in other fields. Section 3 presents the reference empirical specifications, while section 4 presents the results from these models. Section 5 examines the robustness of these specifications to focusing only on R & D positions (by classification and by activities) and allowing for education to be endogenous. Section 6 concludes by presenting the implications of these results for policies intended to accelerate the speed of transition of higher education graduates to stable employment.

2 The School-to-Work Transitions of Engineers and PhDs in France

The transition from school to a stable job differs dramatically between engineers and PhDs in France. This section begins by presenting several stylized facts related to differences in the school-to-work transition between PhDs and engineers. It then briefly describes the key differences between the two populations and discusses the types of jobs targeted by PhDs and engineers in their job search. It ends by presenting a program that was designed to speed the transition to stable employment for PhDs that will be exploited in the empirical work[3].

2.1 Stylized Facts on the School-to-Work Transition of Engineers and PhDs

The most striking stylized fact concerning the school-to-work transition of engineers and PhDs is the difference in unemployment rates three years after leaving school. As shown in figure 1, the unemployment rate three years after leaving school is only 3.5% for people who left school with a degree from an engineering school[4], while PhDs have an unemployment rate of 8.6% three years after leaving school. Some people with engineer degrees continue on to complete a PhD, and despite entering the labor market with additional human capital and (on average) 4.5 years older, their unemployment rate is nearly twice that of students who stop after obtaining their engineer degree. Nevertheless, having obtained an engineer degree before undertaking a PhD is associated with a lower unemployment rate, as these graduates have an unemployment rate that is roughly three-quarters of the unemployment rate of students with PhDs in the same field[5] but without an engineering degree. This who chose a different field for their PhD studies are the most likely to be unemployed after three years, with an unemployment rate nearly triple that of engineers.

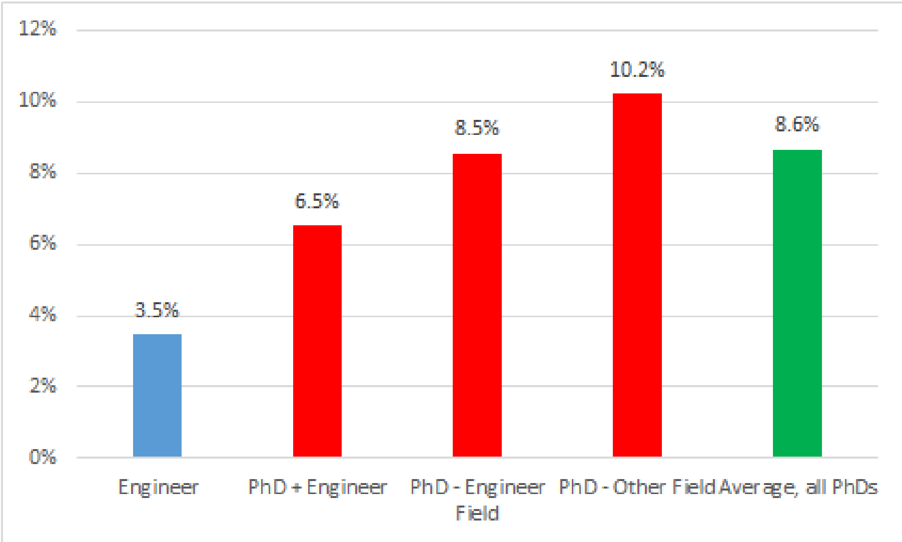
In addition to having a lower unemployment rate, engineers transition to their first stable job sooner than doctors of all types. Figure 2 shows the distribution of time to the first stable job

[3]For a more detailed comparison of PhDs and engineers along all of these dimensions, see Margolis and Miotti (2015).

[4]France has a dual higher education system, with a university track and a "higher school" (grande école) track, distinguished primarily by the fact that entry into the university track is open to any student who successfully passed their baccalauréat (with one exception), while the "higher schools" can select students at entry. Among the "higher schools", several are considered engineering schools and deliver an engineering degree (diplôme d'ingénieur), although the fields covered can extend beyond standard fields such as mechanical engineering, electrical engineering, etc. into such fields as statistics or economics. The non-engineering fields are also typically available in the university track as well.

[5]An engineer field is defined as a field of doctoral study chosen by a student who completed a PhD degree after having previously obtained an engineer degree. Note that this is an empirically-based definition using data from Génération 2004, not a definition based on an a priori classification of fields of study. See appendix A for a list of fields thus defined as "engineer fields" and those defined as "other fields".

Figure 1: Unemployment Rate of PhDs and Engineers in 2007,
3 Years After Leaving School



Source: Génération 2004

for engineers and all three types of PhDs among those who have found a stable job before their censoring date[6]. Engineers and PhD + Engineers find their stable jobs the fastest, but there is a notable mode in the distributions of time to first stable job for PhD - Engineer Field and PhD - Other Field graduates at 12 and 24 months. This suggests that these individuals may be accepting temporary positions, such as 1 or 2 year post docs, that delay the start of their first stable job.

2.2 The Characteristics of Engineers and PhDs

Beyond their fields of study, engineers and PhDs differ along many important dimensions that can be related to the speed at which they find their first stable job. Table 1 presents the main characteristics of the sample of PhDs and engineers being studied; additional variables are presented in appendix table B.1. Clearly, engineers take less time to find their first stable job on average than PhDs since they are both less likely to be censored and have shorter average times to their first stable job when uncensored. In general, most of the characteristics that are overrepresented among engineers are characteristics typically associated with shorter unemployment durations, although engineers tend to enter the labor market at a younger age than PhDs, which tends to be associated with a lower probability of employment.

When comparing PhDs who specialize in a non-engineer field to engineers who left school

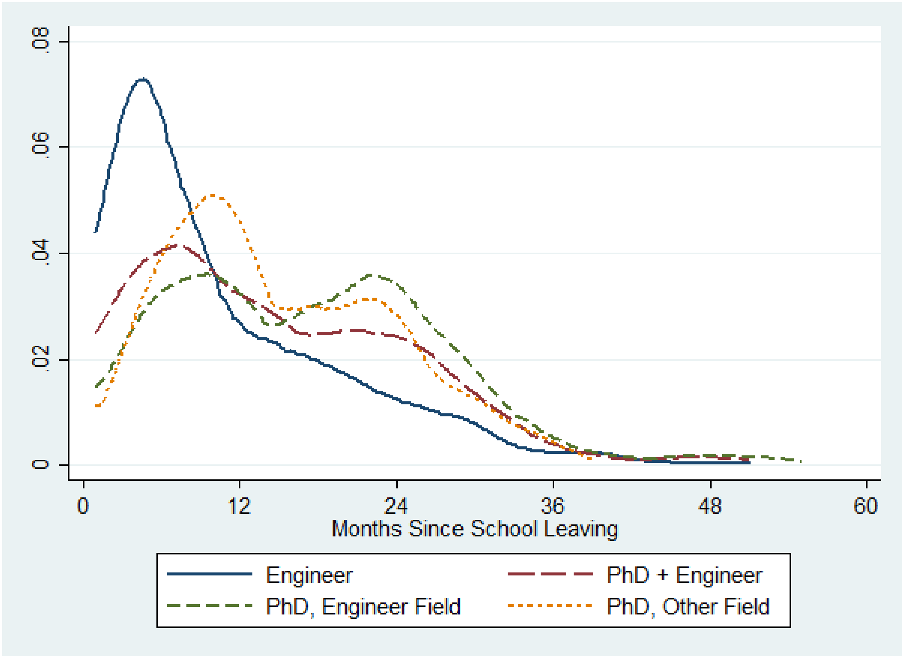
[6]All individuals were either censored 3 or 5 years after leaving school, depending on whether on not they completed the "full questionnaire" in 2007 and the ability of the CEREQ to locate them. The share of individuals that found a stable job before the end of the sample window, by degree, was 86.5% for engineers, 65.7% for PhD + Engineers, 48.8% for PhD - Engineer Field and 45.3% for PhD - Other Field.

Table 1: Descriptive Statistics for Key Variables, Means with Std. Deviations in Parentheses

	Overall Mean	Engineers	PhD + Engineer	PhD - Engineer Field	PhD - Other Field
Time to First Stable Job	12.767	11.273	20.284	16.832	13.914
If Uncensored	(10.9008)	(9.6476)	(14.1164)	(13.3132)	(7.8524)
Time to First Stable Job	24.323	16.402	26.192	37.426	28.420
or Censoring	(20.9855)	(16.5471)	(16.9506)	(22.0023)	(17.1554)
Percentage Uncensored	0.701	0.871	0.734	0.439	0.471
	(0.4578)	(0.3355)	(0.4418)	(0.4962)	(0.4993)
Male	0.645	0.768	0.722	0.443	0.467
	(0.4785)	(0.4221)	(0.4480)	(0.4968)	(0.4990)
Born in France	0.954	0.965	0.974	0.930	0.959
	(0.2104)	(0.1834)	(0.1593)	(0.2558)	(0.1986)
Age at School Leaving	25.793	23.872	28.116	28.468	29.744
	(2.9413)	(1.1856)	(1.7668)	(2.4413)	(2.1775)
Skipped a Grade	0.110	0.096	0.093	0.130	0.159
Before 6th Grade	(0.3026)	(0.2814)	(0.2899)	(0.3307)	(0.3410)
Repeated a Grade	0.012	0.010	0.012	0.015	0.019
Before 6th Grade	(0.1072)	(0.0952)	(0.1104)	(0.1212)	(0.1353)
Did Not Attend 6th Grade	0.003	0.003	0.002	0.001	0.009
	(0.0513)	(0.0533)	(0.0453)	(0.0338)	(0.0941)
Baccalauréat Other Than General	0.106	0.128	0.029	0.079	0.068
	(0.1968)	(0.2091)	(0.1142)	(0.1748)	(0.1733)
Baccalauréat with	0.352	0.347	0.350	0.372	0.298
Honorable Mention	(0.4530)	(0.4452)	(0.4715)	(0.4665)	(0.4442)
Baccalauréat with Honors	0.201	0.207	0.333	0.183	0.179
	(0.3840)	(0.3865)	(0.4715)	(0.3715)	(0.3746)
Baccalauréat with High Honors	0.051	0.054	0.153	0.035	0.057
	(0.2116)	(0.2166)	(0.3600)	(0.1817)	(0.2195)
Fields of Study					
Life Sciences	0.025	0.002	0.046	0.070	
	(0.1552)	(0.0457)	(0.2094)	(0.2548)	
Chemistry	0.025	0.017	0.110	0.038	
	(0.1558)	(0.1295)	(0.3126)	(0.1908)	
Physics	0.038	0.035	0.211	0.039	
	(0.1911)	(0.1827)	(0.4082)	(0.1928)	
Health	0.230	0.020	0.107	0.672	
	(0.4209)	(0.1405)	(0.3091)	(0.4696)	
Economics	0.011	0.002	0.008	0.031	
	(0.1065)	(0.0474)	(0.0903)	(0.1733)	
General and	0.030	0.050	0.018	0.000	
Precision Mechanics	(0.1713)	(0.2180)	(0.1323)	(0.0000)	
Fundamental Industrial	0.114	0.185	0.032	0.009	
Technologies	(0.3175)	(0.3880)	(0.1766)	(0.0940)	
Electricity and Electronics	0.063	0.099	0.038	0.007	
	(0.2421)	(0.2992)	(0.1922)	(0.0853)	
Computer Science	0.075	0.109	0.095	0.024	
	(0.2631)	(0.3116)	(0.2927)	(0.1520)	
Earth Sciences	0.011	0.008	0.042	0.016	
	(0.1031)	(0.0885)	(0.2018)	(0.1243)	
Other Engineer Fields	0.196	0.266	0.293	0.095	
	(0.3970)	(0.4418)	(0.4551)	(0.2937)	
Number of Observations	2,526	920	184	1,052	370

Source: Génération 2004.

Figure 2: Time to First Stable Job Among Uncensored Observations



Source: Génération 2004

immediately after completing their degree, we find several factors that could be linked to their slower insertion into the labor market. First, the PhDs are much more likely to be women than the engineers. Moreover, they are significantly less likely to have obtained their baccalauréat with honorable mention (P-value=0.0902). By definition, they study different fields than those chosen by engineers who continue on to do a PhD, and although some fields studied by these doctors are as successful in obtaining jobs as the specialties followed by engineers who continue to a PhD, most of the fields have higher unemployment rates 3 years after leaving school (Margolis and Miotti, 2015). On the other hand, these PhDs are much more likely to have skipped a grade earlier in their schooling, and are more likely to have done a general baccalauréat (instead of a technical or professional baccalauréat), both factors associated with higher employability.

Considering PhDs in engineer fields who do not have an engineering degree, they also have characteristics that make them less likely to find stable jobs than engineers. As with PhDs from other fields, they are significantly less likely to be male. They are also less likely to have been born in France (P-value=0.0005) and they are significantly less likely to have obtained their baccalauréat with high honors (P-value 0.0414). They are also significantly more likely to specialize in fields that have been found to have difficulty finding jobs, such as chemistry (P-value=0.0054), life sciences (P-value=0.0000) and economics (P-value=0.0000), and less likely to choose fields that find jobs easily, such as electricity and electronics (P-value=0.0000), computer science (P-value=0.0000) and other engineering fields (P-value=0.0000). However, like other PhDs, they also have certain characteristics associated with faster job finding, such as being more likely to have skipped a grade before sixth grade (P-value=0.0187) and being more likely to have done a general baccalauréat (P-value=0.0004).

The main differences between engineers who pursue their studies with a PhD and other engineers relate to their performance on the baccalauréat exam and their choices of field of study. The engineers who continue their studies with a PhD were significantly more likely to have obtained their baccalauréat with honors (P-value=0.0002) or high honors (P-value=0.0000) than engineers who did not, suggesting that these students were the most successful of all graduates in our sample at the time they passed their baccalauréat. However, they are also much more likely to have specialized in less-promising fields such as chemistry, life sciences and physics (all with P-value=0.0000), and less likely to choose fields that find jobs easily, such as electricity and electronics (P-value=0.0081) and fundamental industrial technologies (P-value=0.0000).

2.3 The Types of Jobs Targeted by PhDs and Engineers

Another possible explanation for the slower transition to stable jobs by PhDs relative to engineers could be that they engage in directed search. If engineers are open to a wide range of positions in the private or public sector while PhDs initially target positions for which the supply is particularly limited, or only target permanent positions after a series of fixed-term positions such as post-docs or temporary teaching posts, one would expect PhDs to take longer to find stable jobs than engineers.

Table 2 describes the career plans that PhDs held at the time of their defense[7]. Overall, nearly three quarters of PhDs wanted to work in the public sector, almost exclusively in research. However, only 52% of PhD + engineers were targeting public sector research positions (which includes professors), while 69% of PhD - engineer field students and 87% of PhD - other field students were targeting those jobs. However, when PhD - other field students plan on careers in the private sector, they do not target R & D positions, whereas other types of PhDs still aim for research positions, albeit with a weaker preference for research than among those looking for public sector positions. These career plans may be reflecting a “taste for science” among PhDs in line with the results of Roach and Sauermann (2010), who have shown that PhDs who look for private sector positions have a weaker “taste for science” and a stronger preference for the development side of research and development, relative to those who target an academic career. These PhDs who targeted the private sector were also shown to be more attentive to questions of earnings and access to resources more generally.

Despite having initially targeted public sector research position, most PhDs (and the vast majority of engineers) find themselves employed in the private sector three years after leaving

[7]Information on career plans of engineers is not available in the Génération 2004 survey.

Table 2: Career Plans of PhDs at the Time of Defense, in %

	PhD + engineer	PhD - engineer field	PhD - other field	Total
Public Sector	**53,73**	**71,68**	**88,87**	**74,70**
of which				
Public research	52,50	69,09	87,01	72,79
Teacher	0,66	1,95	0,53	1,31
Other civil servant	0,57	0,64	0,53	0,60
Private Sector	**43,08**	**24,98**	**9,36**	**22,24**
of which				
Research in a company	34,97	16,26	2,01	14,05
Other private sector employment	8,11	8,72	7,35	8,19
Work in research	0,33	0,48	0,13	0,35
Other	0,33	1,77	1,98	1,65
Do not know, No preference	**2,54**	**1,07**	**0,46**	**1,06**

Source: Génération 2004

school. Table 3 shows the distribution of jobs held by engineers and PhDs three years after obtaining their degree. Over 90% of engineers are employed in the private sector, while PhD + engineer and PhD - engineer field graduates are split roughly half-and-half between the public and private sectors. On the other hand, only 27% of PhD - other field graduates are employed in the private sector. Moreover, this is the category of PhD for whom the actual placement differs the most from their career plan upon obtaining their degree[8].

The fact that PhDs find themselves in jobs that differ significantly from those that they originally targeted suggests that the career plans were revised during the three years between degree receipt and the survey administration and that PhDs are particularly prone to "structural career accidents" (Margolis and Yassin, 2017). Such a result would be consistent with directed search in a narrow area (public sector research positions) in the period soon after obtaining a degree, with the set of acceptable jobs being broadened as time goes by. Since public sector research positions are rare relative to private sector jobs, even a reservation wage equal to the minimum wage might not be sufficient to find an acceptable job offer, as the offer arrival rate is likely to be very low. By broadening the set of acceptable offers, the offer arrival rate increases and the probably of finding a job can increase as well, provided that the reservation wage does not increase too much as a result of looking for a job among a broader set of potential employers with a potentially different offered wage distribution.

[8]Given that the career plans are measured three years after the defense, it is possible that the responses to the career plan questions in the Génération 2004 survey suffer from ex-post rationalization bias. If this were to be the case, then the differences reported here would underestimate the true gap between career plans at graduation and actual career outcomes.

Table 3: Jobs Held Three Years After Degree Receipt by Type of Employer, in %

	Engineers	PhD + Engineers	PhD - Engineer Field	PhD - Other Field	Total
Public Sector	**7,33**	**49,76**	**46,50**	**73,34**	**24,93**
of which					
Professors and Teachers	3,17	34,09	24,38	62,51	14,84
Other Central Government	1,95	10,15	7,58	6,14	4,13
Local Government	1,36	0,54	1,22	3,28	1,45
Hospitals	0,10	3,26	12,06	0,48	3,57
Other Public Sector	0,75	1,72	1,26	0,93	0,94
State-Owned Enterprises	**1,81**	**0,73**	**0,51**	**0,00**	**1,27**
Private Sector	**90,85**	**49,50**	**52,99**	**26,66**	**73,80**

Source: Génération 2004

2.4 The "Young Doctors Program" (Dispositif Jeunes Docteurs) of the Research Tax Credit (Crédit Impôt Recherche)

In 1999, the French government introduced the "Young Doctors Program" (DJD) of the Research Tax Credit (CIR) in an attempt to reduce the cost to private sector firms of hiring PhDs. This program has been made increasing generous over time, although its usage was still rather limited during the period under investigation in this paper (2004-2009)[9]. Such a reform could be an appropriate policy response to the relatively slow transition of PhDs into stable jobs if part of the reason was that reservation wages were "too high" relative to the value of marginal product of PhDs in the private sector. This could occur, for example, if PhDs overestimate the offered wage distribution in the private sector or if they require a compensating differential in order to accept a private sector job over one in the public sector. Giraud et al. (2014) provides a detailed description of the CIR and its changes over time; below we briefly present the main reforms that occurred during our sample window and how they have successively reduced the cost of hiring a PhD relative to an engineer.

2.4.1 The Origins of the DJD (Law of July 12, 1999 on Innovation and Research) and the Situation on January 1, 2004

Article 8 of the Law on Innovation and Research introduced the DJD into the CIR. This program allowed firms to include 100% of compensation cost associated with the hiring of PhDs as operating costs in calculating their research tax credit[10] for the first 12 months after their hiring,

[9]See Margolis and Miotti (2015) for details on takeup of the DJD program by employers.

[10]Research-related compensation costs were normally included in operating costs at a fixed rate of 75%.

provided that they were hired on an indefinite term contract and that total employment in the firm was not lower than the previous year. This change meant that firms could include the entirety of compensation cost, instead of only three-quarters of compensation cost, if they hired a PhD instead of an engineer for a researcher or research technician position.

2.4.2 The DJD in the 2006 Reform

Article 22 of the 2006 budget reformed the DJD by allowing firms to account for the compensation cost associated with the hiring of a PhD at 200% of its actual cost[11]. Moreover, firms could include 200% of compensation cost associated with the hiring of PhDs as operating costs in calculating their research tax credit, instead of the previous 100%, for twelve months. The conditionality was left unchanged. This reform further reduced the cost of hiring PhDs, as both the operating cost and direct compensation cost dimensions dimensions of the tax credit calculation were increased only for PhDs, not for engineers, in research positions.

2.4.3 The DJD in the 2008 Reform

Article 69 of the 2008 budget reformed both the CIR and the DJD. This reform extended the pre-existing DJD conditions to 24 months, both for the direct accounting of compensation and for the inclusion of compensation cost in operating costs, without changing the conditionality. Moreover, the general reforms to the CIR, in particular the shift from calculating the credit based on *changes* in research spending to calculating the credit based on *levels* of research spending, transformed the 2008 DJD reform into a massive subsidy for hiring research personnel (Bozio et al., 2014) and further increased the potential impact of these reforms in terms cost reductions for firms that hired PhDs.

3 Econometric Specification

In order to understand the determinants of the speed at which PhDs and engineers find stable jobs, we use proportional hazard duration models (Lancaster, 1990). This approach, which involves estimating the determinants of the rate of exit from a spell (in this case the time between obtaining one's degree and finding one's first stable job[12]) is particularly well adapted to modeling the school-to-work transition for three reasons. First, the length of the spell is positive-valued and stochastic, even conditional on observables. Second, the length of the spell

[11] Prior to this reform, the compensation cost associated with researchers and research technicians entered into the base for which the CIR was calculated at its actual value.

[12] We also consider a second type of spell, the time between obtaining one's degree and finding one's first indefinite term contract in the private sector.

can be affected by observable and unobservable characteristics, but can also exhibit time dependence for reasons other than changes in composition of the risk pool. Third, spells can be right-censored, meaning that (in this case) one does not observe the time at which the person finds his or her first stable job, only a time strictly less than that date (typically when the sample window ends[13]).

Concretely, we estimate a series of proportional hazards duration models, each of which is designed to allow us to examine empirically the various possible explanations for the difference in the speed of finding a stable job. The contribution to the likelihood function for an individual i with observable time-invariant characteristics X_i for which the time t_i is observed, where t_i is the time to the first stable job when an indicator $d_i = 1$ and t_i is the time to right censoring when $d_i = 0$ can be written as:

$$L\left(t_i \left| d_i, X_i \right.\right) = h\left(t_i \left| X_i \right.\right)^{d_i} \exp\left(-\int_0^{t_i} h\left(s \left| X_i \right.\right) ds\right), \tag{1}$$

with $h\left(t_i \left| X_i \right.\right)$ being the hazard function and $\exp\left(-\int_0^{t_i} h\left(s \left| X_i \right.\right) ds\right)$ being the survivor function. The hazard function $h\left(t_i \left| X_i \right.\right)$ takes the standard proportional hazards form, with

$$h\left(t_i \left| X_i \right.\right) = g\left(X_i\right) h_0\left(t_i\right), \tag{2}$$

with $g\left(X_i\right) = \exp\left(X_i \beta\right)$ being the proportionality factor and $h_0\left(t_i\right)$ being the baseline hazard. In the case of a piecewise constant baseline hazard,

$$\begin{aligned} h_0\left(t\right) = \quad & \theta_0 \text{ si } 0 < t \leq \tau_0 \\ & \theta_1 \text{ si } \tau_0 < t \leq \tau_1 \\ & \vdots \\ & \theta_{k+1} \text{ si } t > \tau_k. \end{aligned}$$

The models are built sequentially, starting with a baseline specification that allows us to begin examining the "all else equal" hypothesis by conditioning on observable characteristics. These baseline specifications also allow us to understand the importance of directed search away from private sector positions, as well as confirming the flexibility of our parametric specification relative to a semiparametric alternative[14]. We then consider the hypothesis of inappropriate reservation wages by introducing a set of time-varying covariates[15] for the various reforms of

[13] Models that restrict attention to a subset of stable jobs, such as private sector stable jobs or R & D positions, estimate the models using a competing risks framework in which the censoring time can either be the end of the sample window or the time at which the individual makes a transition to another type of stable job. This occurs, for example, when examining the time to the first stable private sector job and an individual finds a public sector position (which has a guarantee of lifetime employment) first.

[14] See Cox (1972) for a presentation of the semi-parametric models used here. The estimated models explicitly account for the interval-observed nature of the Génération 2004 data, since spell lengths in the data are measured in months and not in continuous time.

[15] Time-varying covariates are incorporated into equation (1) by breaking up the spell into pieces during which

the DJD, which should affect private sector research personnel as a whole and PhDs in particular. We next consider the role of unobserved heterogeneity[16], in case there are unobserved factors that affect the speed of transition other than observable characteristics and compensation cost. Controlling for unobserved heterogeneity can be important, for example, in the unlikely event that individuals delay their school leaving in order to take advantage of future reforms[17], which would make the DJD-related covariates endogenous. Finally, we explore the robustness of these results in two directions, first by considering a narrower definition of directed search (R & D positions with or without professorships) and second by allowing for education to be endogenous with respect to the job finding process.

Since the estimation of a proportional hazards model with unobserved heterogeneity using the Heckman and Singer (1984) technique requires the specification of a parametric baseline hazard[18], we suppose a flexible parametric model using a piecewise constant baseline hazard function as described in equation (3) in addition to a semiparametric specification. To implement the piecewise constant model, we must choose the time intervals over which we assume the hazard rate into stable jobs to be constant (conditional on observables and unobservables). This choice must allow for enough flexibility to capture the time path of observed exits, yet not specify intervals so narrowly that too few exits are observed in any given interval to identify the associated parameter. After observing the unconditional distribution of exits to stable jobs, we chose to specify the following intervals for the piecewise constant baseline hazard (in months): (0-12], (12-15], (15-18], (18-21], (21-24], (24-27], (27-30], (30-33], (33-36], (36-41], (41-∞).

The proportionality factor in the proportional hazards specification includes a number of observable characteristics that reflect an individual's family environment, the local context when leaving school, characteristics of his or her educational history and other demographic characteristics. In particular, our specifications include the following variables: highest degree obtained[19], gender, whether or not the person was born in France, whether or not the person skipped a grade before sixth grade, whether or not the person repeated a grade before sixth grade, whether or not the person ever attended sixth grade, if the person obtained their baccalauréat with honorable mention (assez bien), honors (bien) or high honors (très bien ou félic-

the covariates remain constant, and treating treating each sub-spell as right censored and/or stock sampled as needed. See Lancaster (1990) for details.

[16] Unobserved heterogeneity is modeled using the approach proposed in Heckman and Singer (1984).

[17] Students might expect that their chances of finding a job increase when the cost of hiring them falls, and thereby delay school exit to minimize the expected time spent searching. However, despite the fact that the CIR was being reformed on an annual basis, the 2006 and 2008 reforms were not pre-announced in 2004 and thus such anticipatory behavior seems unlikely.

[18] Heckman and Singer (1984, p. 300) note that although one can establish the integrability of the likelihood in the general case, "To produce explicit formulae requires adopting a parametric specification for $z(t)$ and $\zeta(x)$".

[19] We examine only PhDs and engineers, and distinguish individuals with a PhD and an engineering degree, those with a PhD and no engineering degree who have studied a field in which PhD + engineers have studied, and PhDs without engineering degrees who have studied other fields.

itations du jury), the field of study (12 different fields) the region in which the institution that delivered the highest degree obtained was situated (22 regions), the occpuation of the father at the time of graduation (7 categories) and the occupation of the mother at the time of graduation (7 categories). Descriptive statistics can be found in tables 1 and B.1.

4 Main Results

This section presents the results from estimating the main models described in section 3. We begin by presenting the baseline specification that conditions on observable characteristics. These baseline specifications allow us to examine directly the differences in the speed of finding a stable job for PhDs versus engineers, and allow us to explore the role of the parametric assumptions for the baseline hazard and impact of engaging in job search that prefers public sector to private sector jobs. We then explore the additional effect that reducing the relative cost of employing PhDs has on the speed of transition into stable jobs by introducing the time-varying covariates associated with the DJD reforms. Finally, we observe how the estimates change with the introduction of unobserved heterogeneity.

4.1 Baseline Models

Columns 1 and 2 of table 4 present the main results from estimating our model of the instantaneous rate of finding one's first stable job, provided that the first stable job had not yet been found (the hazard rate). Recall that a positive coefficient in the proportionality factor of the hazard rate implies a faster transition to a stable job, and thus a shorter time between school leaving and the start of the first stable job. Comparing columns 1 and 2 shows that the piece-wise constant assumption does not appear to significantly affect the estimated coefficients on observables relative to the semiparametric (Cox) alternative.

Table 4: Effect of Education on Hazard Rate to a Stable Job, Without Unobserved Heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Model Without DJD Reforms				Model With DJD Reforms			
	All Stable Jobs		Private Sector Only		All Stable Jobs		Private Sector Only	
	Cox	Piecewise Constant	Cox	Piecewise Constant	Cox	Piecewise Constant	Cox	Piecewise Constant
PhD + Engineer	-0.4945***	-0.4769***	-0.8212***	-0.8150***	-0.5753***	-0.5523***	-0.8666***	-0.8587***
	(0.1463)	(0.1461)	(0.1767)	(0.1765)	(0.1645)	(0.1643)	(0.1979)	(0.1977)
PhD - Engineer Field	-0.7269***	-0.7085***	-1.0964***	-1.0915***	-0.9165***	-0.8899***	-1.2918***	-1.2835***
	(0.1182)	(0.1180)	(0.1384)	(0.1382)	(0.1274)	(0.1272)	(0.1496)	(0.1494)
PhD - Other Field	-0.7690***	-0.7574***	-1.5607***	-1.5578***	-0.7445***	-0.7240***	-1.4568***	-1.4489***
	(0.1645)	(0.1645)	(0.2109)	(0.2108)	(0.1766)	(0.1766)	(0.2276)	(0.2275)
Male	0.1579**	0.1588**	0.1601**	0.1610**	0.2586	0.2577	0.2044	0.2034
	(0.0667)	(0.0667)	(0.0774)	(0.0773)	(0.1748)	(0.1745)	(0.1942)	(0.1939)
School Leaving Age	-0.0529***	-0.0535***	-0.0708***	-0.0716***	-0.1233	-0.1214	-0.1564	-0.1537
	(0.0195)	(0.0195)	(0.0234)	(0.0234)	(0.0937)	(0.0937)	(0.1096)	(0.1095)
Born In France	0.2429	0.2434	0.1850	0.1862	-0.0604***	-0.0608***	-0.0778***	-0.0785***
	(0.1745)	(0.1743)	(0.1939)	(0.1936)	(0.0196)	(0.0196)	(0.0236)	(0.0236)
Bac: Professional or	-0.6082***	-0.6028***	-0.5399**	-0.5428**	0.1156	0.1135	0.0738	0.0726
Technical Track	(0.2250)	(0.2245)	(0.2373)	(0.2370)	(0.0720)	(0.0720)	(0.0820)	(0.0820)
Baccaluréat with	0.1253*	0.1223*	0.0818	0.0801	0.1669*	0.1653*	0.0805	0.0783
Honorable Mention (AB)	(0.0719)	(0.0719)	(0.0819)	(0.0819)	(0.0852)	(0.0852)	(0.0974)	(0.0974)
Baccalauréat with	0.1734**	0.1714**	0.0862	0.0844	0.2888**	0.2872**	0.0614	0.0572
Honors (B)	(0.0851)	(0.0851)	(0.0973)	(0.0973)	(0.1293)	(0.1292)	(0.1610)	(0.1610)
Baccalauréat with	0.3017**	0.3001**	0.0733	0.0697	-0.5559***	-0.5624***	-0.5754***	-0.5780***
High Honors (TB)	(0.1294)	(0.1293)	(0.1612)	(0.1612)	(0.1775)	(0.1775)	(0.2122)	(0.2121)
Log Likelihood	-8837	-2589	-6738	-2198	-8806	-2558	-6712	-2172
Weighted Equivalent Observations	11,028	11,028	11,028	11,028	11,028	11,028	11,028	11,028

Standard Errors in Parentheses. Models also include controls for foreign born, having skipped a grade before 6th grade, having repeated a grade before sixth grade, not having attended sixth grade, field of studies (12 categories), region of the higher education institution (22 regions), father's occupation (7 categories) and mother's occupation (7 categories). The reference person has an engineering degree, is female, did general track studies for the baccalauréat, and obtained the baccalauréat with no mention or honors.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

The results in table 4 show that, all else (observable) equal and before accounting for the effects of the DJD reforms, engineers find stable jobs significantly faster than all types of PhDs. Given that this effect persists even after controlling for broad range of observables, it may be due in part to the fact that graduates from some engineering schools in France are guaranteed civil service positions upon graduation, which shortens the time to finding a stable job as no extra job search is required. In particular, even after controlling for the field of study, school leaving age and performance on the baccalauréat exam, PhD + engineers still find stable jobs significantly slower than engineers. There also appears to be an engineering degree effect when comparing PhDs in engineer fields who have an engineering degree to those who do not; the former find their first stable job significantly faster (P-value=0.0560 in the Cox specification) than the latter. The field of study does not appear to have a significant effect on the speed of finding a stable job when one includes the public sector, as the hazard rates of PhD - engineer field and PhD - other field graduates are not significantly different from each other (P-value=0.7879).

The impact of directed search becomes particularly clear when comparing columns 1 and 2 of table 4 with columns 3 and 4. The first point note is that all of the coefficients on PhD categories become significantly more negative when restricting attention to transitions into private sector stable jobs only. This means that whereas the overall stable job hazard rate for a PhD with an engineering degree PhDs might be 61% of a comparable engineer's hazard rate[20], the private sector stable job hazard rate for PhD + engineers is only 44% that of engineers[21]. Moreover, the field of study becomes more important when focusing on private sector jobs, as the difference between PhD - engineer field and PhD - other field graduates becomes significant (P-value= 0.0208). This suggests that PhDs who study fields other than those chosen by engineers are at a disadvantage when looking for private sector jobs, but that this disadvantage is counterbalanced by a relatively higher likelihood of finding a stable job in the public sector so that overall there is no significant difference among PhDs without engineer degrees when pooling public and private sector jobs.

4.2 Baseline Models, Controlling for DJD Reforms

Introducing time-varying covariates to the baseline specification to account for exogenous variation in the relative cost of hiring PhDs (as implied by the successive reforms to the DJD) has an important effect on the hazard rates of PhDs relative to engineers. Note that since the DJD reforms are introduced as time varying covariates, the figures in columns 5-8 of table 4 reflect hazard rates prior to the 2006 reform. Hazard rates after the 2006 reform and before the 2008 reform are found by combining the results in table 4 with those in table 5, as are the results for the period after the 2008 reform.

[20] $\exp(-0.4945) = 0.6099$.

[21] $\exp(-08212) = 0.4399$.

Table 5: Effect of DJD Reforms on Hazard Rate to a Stable Job, Without Unobserved Heterogeneity

	(1)	(2)	(3)	(4)
	All Stable Jobs		Private Sector Only	
		Piecewise		Piecewise
	Cox	Constant	Cox	Constant
Post 2006 Reform	-0.8490***	-0.8230***	-0.7616***	-0.7569***
	(0.1564)	(0.1558)	(0.1837)	(0.1832)
Post 2008 Reform	-4.0126***	-3.5198***	-3.9497***	-3.4492***
	(1.0119)	(0.8427)	(1.0607)	(0.8732)
Post 2006 Reform *	0.2324	0.2110	0.0710	0.0626
PhD + Engineer	(0.2463)	(0.2462)	(0.3138)	(0.3137)
Post 2008 Reform *	4.4955***	4.3864***	4.8074***	4.7073***
PhD + Engineer	(1.0217)	(1.0195)	(1.0294)	(1.0257)
Post 2006 Reform *	0.5514***	0.5279***	0.5528***	0.5448***
PhD - Engineer Field	(0.1414)	(0.1412)	(0.1615)	(0.1613)
Post 2008 Reform *	2.3684***	2.2771***	2.5438***	2.4723***
PhD - Engineer Field	(0.8096)	(0.8088)	(0.8122)	(0.8114)
Post 2006 Reform *	-0.0341	-0.0575	-0.3198	-0.3293
PhD - Other Field	(0.2216)	(0.2215)	(0.3493)	(0.3492)

Notes: Models contain the same control variables as in table 4. The reference group is narrowed to include only the period from January 1 2004 to December 31 2005 for the reference person.
*** p<0.01, ** p<0.05, * p<0.1

Table 5 shows that the hiring of PhDs is indeed sensitive to their compensation cost[22]. Although engineers still have a significantly higher hazard rate than all forms of PhDs prior to the reforms in 2006, and despite the fact that the coefficients for all types of PhD do not significantly change, the difference between PhD - engineer field and PhD - other field graduates when looking for private sector jobs disappears (P-value=0.3180 in the Cox specification), suggesting that the DJD advantage of PhD - engineer field graduates seen in table 4 stems from the post-reform periods.

When looking directly at the effects of the reforms (table 5), it becomes clear that the massive subsidy associated with the 2008 reform had significant effects on PhDs who studied engineer fields regardless of whether they already had an engineering degree[23], as did the 2006 reform for PhD - engineer field graduates. The sizes of the coefficients associated with the 2008 reforms are large enough to reverse the relative speed of transition into stable jobs. Using the piecewise constant results for PhD - engineer field graduates as an example, the hazard rate into stable jobs was 0.4107 times that of engineers[24] prior to 2006, 0.6963 times that of engineers between 2006 and 2008[25] and 4.0036 times that of engineer after 2008[26]. Note that the coefficient on the post-2008 reform variable is large and significantly negative, likely reflecting the role of the crisis in firm hiring overall. It is possible that part of the large positive post-2008 effect that only affects PhDs can still be explained by changes in the composition of graduates who are still without a stable job after 2008 in the dimension of unobservables, a possibility we address in section 4.3 below.

4.3 Models Controlling for DJD Reforms and Unobserved Heterogeneity

The baseline models presented thus far do not control for unobserved heterogeneity, and thus changes in the composition of the pool of individuals who have yet to find a stable job along the dimension of unobserved characteristics can bias the estimators of time varying covariates, such as the DJD reform indicators, and the baseline hazard. We therefore adopt the approach of Heckman and Singer (1984) to introducing unobserved heterogeneity and rewrite the contri-

[22] Recall that the effect of the reforms is identified, despite having occurred at the same calendar dates for all individuals in the sample, by the fact that time is measured in the model relative to the school leaving date, and thus people who leave school in different months of 2004 will experience the reforms at different lengths of time into their job search process.

[23] The results for PhD - other field graduates are not identified after the 2008 reform because none of these people found a stable job after 2008 in the Génération 2004 data.

[24] $\exp(-0.8899) = 0.4107$.

[25] $\exp(-0.8899 + 0.5279) = \exp(-0.3620) = 0.6963$.

[26] $\exp(-0.8899 + 2.2771) = \exp(1.3872) = 4.0036$.

butions to the likelihood function described in equation (1) as

$$L\left(t_i\left|d_i,X_i\right.\right)=\sum_{m=1}^{M}P\left(\nu=\nu_m\right)h\left(t_i\left|X_i,\nu_m\right.\right)^{d_i}\exp\left(-\int_0^{t_i}h\left(s\left|X_i,\nu_m\right.\right)ds\right). \tag{3}$$

Here, the proportionality factor (the $g\left(X_i\right)$ in equation (2)) becomes $g\left(X_i,\nu\right)=\exp\left(X_i\theta+\nu\right)$, where ν follows a multinomial distribution, with ν_1 normalized to zero and each other ν_m taking on a different positive value. Equation (3) thus shows that individual i contributes his expected contribution to the likelihood function. Imposing the assumptions that $M=2$ and that the baseline hazard is of a piecewise constant form, we get the estimable likelihood function

$$\begin{aligned}L\left(t_i\left|d_i,X_i\right.\right)=\;& P\left(\nu=0\right)e^{X_i\beta}\textstyle\sum_{j=0}^{10}\theta_j^{d_i^j}\\ &\exp\left[e^{X_i\beta}\left(\textstyle\sum_{j=1}^{10}\mathbf{1}_{\tau_{j-1}<t_i}\theta_j\left(\tau_{j-1}-\left(\frac{\tau_j+\tau_{j-1}}{2}\right)^{d_i^j}\tau_j^{1-d_i^j}\right)+\mathbf{1}_{t_i>\tau_{11}}\tau_{11}\theta_{11}\right)\right]\\ +\;& P\left(\nu=\overline{\nu}\right)e^{X_i\beta+\overline{\nu}}\textstyle\sum_{j=1}^{10}\theta_j^{d_i^j}\\ &\exp\left[e^{X_i\beta+\overline{\nu}}\left(\textstyle\sum_{j=1}^{10}\mathbf{1}_{\tau_{j-1}<t_i}\theta_j\left(\tau_{j-1}-\left(\frac{\tau_j+\tau_{j-1}}{2}\right)^{d_i^j}\tau_j^{1-d_i^j}\right)+\mathbf{1}_{t_i>\tau_{10}}\tau_{10}\theta_{11}\right)\right],\end{aligned} \tag{4}$$

where the value of $\overline{\nu}$ and the probability $P\left(\nu=0\right)$ are additional parameters to be recovered.

Table 6 shows that there is indeed unobserved heterogeneity that matters for transitions to stable private sector jobs, but the main conclusions concerning the relative impact of having an engineering degree and the role of the 2008 reform still hold. Columns (1) and (3) reproduce the results from tables 4 and 5 from the piecewise constant columns, and columns (2) and (4) present comparable specifications but controlling for unobserved heterogeneity as in equation (4). The hypothesis test of the estimate of $P\left(\nu=0\right)$ is with respect to a null of $P\left(\nu=0\right)=0.5$[27], whereas a Wald test of the null $\overline{\nu}=0$, which would correspond to an absence of unobserved heterogeneity, is rejected at the ten percent level for exits to private sector stable jobs. Although the coefficients change when controlling for unobserved heterogeneity, especially when looking at transitions to stable jobs in the private sector, the differences in coefficients between columns (3) and (4) are not significant. The only conclusion that is altered based on the inclusion of unobserved heterogeneity is related to PhD - Engineer Field graduates, who are no longer significantly faster than engineers in the 2006-2008 period (P-value=0.1075 with unobserved heterogeneity versus P-value=0.00007 without).

[27] The distribution of the estimator presented in the table is calculated by applying the delta method using a logistic transformation of the estimated underlying parameter.

Table 6: Hazard Rate to a Stable Job, Piecewise Constant Baseline Hazard

	All Stable Jobs		Private Sector Only	
	Without Unobserved Heterogeneity	With Unobserved Heterogeneity	Without Unobserved Heterogeneity	With Unobserved Heterogeneity
PhD + Engineer	-0.5523***	-0.5972***	-0.8587***	-0.9201***
	(0.1643)	(0.1727)	(0.1977)	(0.2093)
PhD - Engineer Field	-0.8899***	-0.9477***	-1.2835***	-1.3657***
	(0.1272)	(0.1346)	(0.1494)	(0.1627)
PhD - Other Field	-0.7240***	-0.7147***	-1.4489***	-1.4486***
	(0.1766)	(0.1849)	(0.2275)	(0.2387)
Post 2006 Reform	-0.8230***	-0.7622***	-0.7569***	-0.6512***
	(0.1558)	(0.1664)	(0.1832)	(0.1991)
Post 2008 Reform	-3.5198***	-3.4310***	-3.4492***	-3.3074***
	(0.8427)	(0.8495)	(0.8732)	(0.8829)
Post 2006 Reform *	0.2110	0.1122	0.0626	-0.1393
PhD + Engineer	(0.2462)	(0.2602)	(0.3137)	(0.3420)
Post 2008 Reform *	4.3864***	4.3905***	4.7073***	4.5397***
PhD + Engineer	(1.0195)	(1.1128)	(1.0257)	(1.1057)
Post 2006 Reform *	0.5279***	0.4170**	0.5448***	0.3399
PhD - Engineer Field	(0.1412)	(0.1678)	(0.1613)	(0.2112)
Post 2008 Reform *	2.2771***	2.0894**	2.4723***	2.1649**
PhD - Engineer Field	(0.8088)	(0.8270)	(0.8114)	(0.8421)
Post 2006 Reform *	-0.0575	-0.1845	-0.3293	-0.5543
PhD - Other Field	(0.2215)	(0.2417)	(0.3492)	(0.3780)
$\overline{\nu}$		1.8450		1.5272*
		(1.3952)		(0.8050)
$P(\nu = 0)$ (Slow Exit)		0.0705**		0.1552
		(0.0836)		(0.1596)
Log Likelihood	-2558	-5406	-2172	-4299
Weighted Equivalent Observations	11,028	11,028	11,028	11,028

Notes: See notes to table 5. *** p<0.01, ** p<0.05, * p<0.1.

5 Robustness

5.1 Search Directed Toward R & D Positions

As noted in section 2.3, the career plans of PhDs when they get their degrees tend to focus on research positions, and in particular public sector research / professor positions. Although there may be many fewer of these positions available, which is part of the reason that PhDs take longer to find stable jobs, it is possible that the quality of human capital acquired during PhD studies may be more relevant for research and/professorial positions, giving PhDs an advantage over engineers when targeting this type of job. Moreover, as many public sector positions if this type require a PhD as a prerequisite to employment, the potential pool of research jobs for engineers without PhDs is likely to be smaller than that of PhDs. All of these arguments suggest that, although PhDs make take longer than engineers to find a stable job overall, they should be able to find stable jobs faster than engineers if attention is restricted exclusively to research positions.

Table 7 shows the results of estimating proportional hazard models with unobserved heterogeneity and controlling for the DJD reforms, but restricting attention only to transitions into R & D positions[28]. The table focuses on positions classified as R & D in France's occupational classification system[29], with and without professors included among R & D positions, as well as positions in which the person's activities on the job are related to research and development[30]. This alternative means of identifying R & D positions is only available for private sector positions in the Génération 2004 survey, but it is necessary because it is unclear, even within the French government[31], whether an individual's eligibility for the CIR is a function of the official classification of his or her position or the activities he or she performs. Furthermore, it is worth noting that there are relatively few stable R & D positions occupied within our sample window, and thus identification of these models, in particular the distributions of

[28]As is typical in a competing risks framework, if a different sort of stable job is found before an R & D position, the time to transition into an R & D job is considered to be censored at the date the other stable job begins.

[29]Classifications considered to be R & D include the following codes: 383A (R & D engineers and professionals in electricity, electronics - Ingénieurs et cadres d'étude recherche et développement en électricité électronique), 384A (R & D engineers and professionals in mechanics and metalworking - Ingénieurs et cadres d'étude recherche et développement en mécanique et travail des métaux), 385A (R & D engineers and professionals in transformative industries (food production, chemistry, metallurgy, heavy materials) - Ingénieurs et cadres d'étude recherche et développement des industries de transformation (agroalimentaire, chimie, métallurgie, matériaux lourds)), 386A (R & D engineers and professionals in other industries (printing, soft materials, furniture and wood, energy, water) - Ingénieurs et cadres d'étude recherche et développement des autres industries (imprimerie, matériaux souples, ameublement et bois, énergie, eau)), et 388A (R & D engineers and professionals in information technology - Ingénieurs et cadres d'étude recherche et développement en informatique).

[30]A job is considered to be an R & D position using this definition when the individual described his or her activities at hiring as "Studies, Research and Development, Methods" (Etudes, Recherche et développement, méthodes) in the Génération 2004 survey.

[31]Interviews with program administrators from the Ministry of Finance (Direction de Trésor) and the Ministry of Higher Education and Research, July 10, 2015.

unobserved heterogeneity, is more fragile than when considering all stable jobs or all stable jobs in the private sector.

Table 7: Hazard Rate to a Stable Job Classified as R & D, Piecewise Constant Baseline Hazard

	(1)	(2)	(3)	(4)	(5)	(6)
		All Stable Jobs			Private Sector Only	
	R & D Classification Without Professors	R & D Classification With Professors	R & D Activities	R & D Classification Without Professors	R & D Classification With Professors	R & D Activities
PhD + Engineer	-0.6289	0.5991*	-0.2136	-0.6221	-0.4277	-0.2652
	(0.4730)	(0.3575)	(0.3965)	(0.4766)	(0.4610)	(0.4123)
PhD - Engineer Field	-1.6866***	0.2905	-0.8988***	-1.7163***	-0.8710**	-0.9154***
	(0.4498)	(0.3146)	(0.3337)	(0.4588)	(0.3860)	(0.3454)
PhD - Other Field	-3.2605***	0.7601*	-2.1206***	-3.2521***	-0.6933	-2.1044***
	(1.1031)	(0.4438)	(0.6678)	(1.1048)	(0.5858)	(0.6730)
Post 2006 Reform	-0.7684*	-1.1335***	-0.4097	-0.7745*	-1.0922***	-0.4220
	(0.4040)	(0.3218)	(0.3376)	(0.4077)	(0.3724)	(0.3489)
Post 2008 Reform	-36.7804	-25.0732***	-3.4434***	-34.2122	-26.0251***	-2.9254**
	(0.0000)	(1.3454)	(1.2330)	(0.0000)	(1.3944)	(1.3326)
Post 2006 Reform *	-0.2031	0.6045	-0.1078	-0.2020	0.4777	-0.2951
PhD + Engineer	(0.6431)	(0.4008)	(0.5003)	(0.6433)	(0.5189)	(0.5488)
Post 2008 Reform *	38.7935***	26.0361***	3.7442**	36.2146***	26.7355***	3.7926**
PhD + Engineer	(1.6595)	(1.6116)	(1.4838)	(1.6672)	(1.6661)	(1.4890)
Post 2006 Reform *	1.1082***	0.8181***	0.6566**	1.0883**	0.8876**	0.7328**
PhD - Engineer Field	(0.4164)	(0.3047)	(0.3073)	(0.4269)	(0.3584)	(0.3175)
Post 2008 Reform *	37.3021***	23.4387	2.9442**	34.7258***	24.7224	3.0414**
PhD - Engineer Field	(1.7331)	(0.0000)	(1.1850)	(1.7349)	(0.0000)	(1.1884)
Post 2006 Reform *		-0.5584	0.4235		-0.5983	0.1690
PhD - Other Field		(0.4570)	(0.7915)		(0.7395)	(0.8436)
$\overline{\nu}$	0.0000	14.7018	0.0000	0.0000	26.3746	0.0000
	(6.1617)	(232.5430)	(1.7139)	(2.3779)	(0.0000)	(6.5091)
$P(\nu = 0)$ (Slow Exit)	0.0063	0.3843*	0.1273	0.0467	0.4818	0.0075
	.	(0.0678)	(281318.6)	.	(0.0838)	
Log Likelihood	-850.7	-1854	-1326	-832.7	-1186	-1255
Weighted Equivalent Observations	11,028	11,028	11,028	11,028	11,028	11,028

Notes: See notes to table 5. *** p<0.01, ** p<0.05, * p<0.1.

When focusing on R & D positions, the advantage of engineers over PhDs changes significantly. Engineers no longer found R & D positions faster than PhD + engineers, and found stable positions more slowly than PhD + engineers prior to the reforms when including the public sector and professor positions (P-value=0.0937). In fact, when considering stable R & D positions including professors, there is no significant difference between engineers and PhD - engineer field graduates prior to 2006, and PhD - other field graduates find their jobs faster during this period (P-value=0.0867). The fact that PhDs do not find their stable R & D jobs in the private sector even more rapidly than in the public sector despite the presence of the DJD (which only benefits private sector employers) is further evidence of directed search by PhDs, as they are not more willing to take a private sector research position, despite the possibility of being more highly paid thanks to the wage subsidy, than they are to take a public sector professorial research position.

The small number of individuals who actually find their first stable private-sector R & D job after 2008 makes the standard errors associated with the 2008 reform variables huge[32], so analysis of the reforms of the DJD is best restricted to the 2006 reform. In this case, it becomes clear that the 2006 reform significantly increased the hazard rate into stable R &D jobs for PhD - engineer field graduates, regardless of the type of employer (public or private), whether R & D is defined by classification or activity, and whether professors are included or not. In fact, PhD - engineer field graduates found their first stable R & D-classified job (including professors) significantly faster than engineers after the 2006 reform (P-value=0.0072). Interestingly, unobserved heterogeneity does not affect transitions into stable R & D positions, as none of the estimated mass points ($\overline{\nu}$) are significantly different from zero.

5.2 Endogenous Education

Part of the reason that engineers find stable jobs sooner than PhD (when not focusing exclusively on R & D jobs) may be that they have unobservable characteristics associated with faster job finding. This may be due to the school they attend, as would be the case if, for example, alumni networks from engineering schools were better at placing students than those of PhD programs or if hiring graduates from a particular engineering school was considered “prestigious” and employers valued this prestige separately from any underlying differences in the productivity of the person being hired. It could also be due to selection of particular students by the schools, which could occur if students who are best able to convincingly reproduce knowledge were both more likely to be accepted to engineering school and more likely to receive a job offer after being given an interview. The choice of the level of education and the field of study could also be related to unobservable characteristics that influence the speed at

[32]Only 3 engineers in the Génération 2004 data found their first stable private-sector R & D-classified jobs, excluding professors, after 2008; the comparable figures were 1 person among PhD + engineers and 1 person among PhD - engineer field graduates.

which people find a stable job. The presence of such endogeneity could bias the estimates of the impact of the degree on the rate at which individuals find stable jobs, and the approach to handling unobserved heterogeneity presented in section 4.3 does not allow for the distribution of unobserved heterogeneity to be correlated with the type of degree (engineer or one of the PhD types). In this section we present a more flexible approach to modeling the unobserved heterogeneity that endogenizes the individual's degree in the duration model.

In order to introduce a possible correlation between the degree and the distribution of unobserved heterogeneity, we allow the probability that an individual's draw from the unobserved heterogeneity distribution has the non-zero mass point to be a function of the degree. More precisely, we modify equation (4) as follows:

$$
\begin{aligned}
L\left(t_i \left| d_i, X_i \right.\right) = \; & P\left(\nu = 0 \left| \text{Degree}_i \right.\right) e^{X_i\beta} \textstyle\sum_{j=0}^{10} \theta_j^{d_i^j} \\
& \exp\left[e^{X_i\beta} \left(\textstyle\sum_{j=1}^{10} \mathbf{1}_{\tau_{j-1}<t_i} \theta_j \left(\tau_{j-1} - \left(\frac{\tau_j+\tau_{j-1}}{2}\right)^{d_i^j} \tau_j^{1-d_i^j} \right) + \mathbf{1}_{t_i>\tau_{11}} \tau_{11}\theta_{11} \right) \right] \\
+ \; & P\left(\nu = \overline{\nu} \left| \text{Degree}_i \right.\right) e^{X_i\beta+\overline{\nu}} \textstyle\sum_{j=1}^{10} \theta_j^{d_i^j} \\
& \exp\left[e^{X_i\beta+\overline{\nu}} \left(\textstyle\sum_{j=1}^{10} \mathbf{1}_{\tau_{j-1}<t_i} \theta_j \left(\tau_{j-1} - \left(\frac{\tau_j+\tau_{j-1}}{2}\right)^{d_i^j} \tau_j^{1-d_i^j} \right) + \mathbf{1}_{t_i>\tau_{10}} \tau_{10}\theta_{11} \right) \right].
\end{aligned}
\tag{5}
$$

As the vector X_i contains indicator variables for the different degree levels and a constant term, the identification of the probabilities in equation (5) comes essentially from the nonlinearity of the likelihood function contributions and the constraint that the value of the non-zero support point of the unobserved heterogeneity distribution ($\overline{\nu}$) is common to all degrees, implying that it is even more fragile than the estimates of section 5.1. The common $\overline{\nu}$ hypothesis corresponds to the idea that there are two types of person in the population, defined by the value of $\overline{\nu}$, but that these people can allocate themselves differently across different types of degrees.

Table 8 shows the results of estimating equation (5). Comparing table 8 with tables 6 and 7 shows that despite a few changes in point estimates, there are no significant differences in the estimated coefficients when allowing for endogenous education. Even the coefficients for transitions to stable R & D-classified jobs without professors for PhD - engineer field graduates, which appear to differ between tables 8 and 7, are not statistically significantly different from each other (P-value=0.2540).

Table 8: Hazard Rate to a Stable Job, Piecewise Constant Baseline Hazard with Endogenous Education

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All Stable Jobs				Private Sector Only			
		R & D Classification	R & D Classification			R & D Classification	R & D Classification	
	All Jobs	Without Professors	With Professors	R & D Activities	All Jobs	Without Professors	With Professors	R & D Activities
PhD + Engineer	-0.8488***	-0.6286	0.8396**	-0.0250	-0.9904***	-1.1139	-0.3683	-0.3094
	(0.1959)	(0.5215)	(0.3262)	(0.4039)	(0.2092)	(1.5417)	(0.4349)	(0.4465)
PhD - Engineer Field	-1.1921***	-2.0357***	0.5142*	-0.7276**	-1.0582***	-2.1700	-0.8895**	-1.0753***
	(0.1659)	(0.5054)	(0.2793)	(0.3390)	(0.1831)	(1.5717)	(0.3588)	(0.3732)
PhD - Other Field	-0.9569***	-3.2637***	0.9517**	-2.0140***	-1.5254***	-3.9322**	-0.7229	-2.2269***
	(0.1916)	(0.9400)	(0.3978)	(0.6752)	(0.2349)	(1.8929)	(0.5541)	(0.7283)
Post 2006 Reform	-0.7262***	-0.7222*	-0.9606***	-0.4128	-0.7054***	-0.8592**	-1.0150***	-0.3016
	(0.1801)	(0.4304)	(0.3081)	(0.3390)	(0.1929)	(0.4346)	(0.3610)	(0.3629)
Post 2008 Reform	-3.4392***	-16.5402	-14.4748	-3.4409***	-3.4323***	-17.6047	-16.1855	-2.6139**
	(0.8648)	(1692.0572)	(423.3376)	(1.2262)	(0.8921)	(2535.2197)	(730.8559)	(1.2760)
Post 2006 Reform *	0.0683	-0.4045	0.6355	-0.0997	-0.0547	-0.1884	0.5421	-0.5337
PhD + Engineer	(0.2751)	(0.6502)	(0.3894)	(0.5003)	(0.3404)	(0.7196)	(0.5045)	(0.5782)
Post 2008 Reform *	4.2986***	19.0060	15.7048	3.8930**	4.6534***	19.8909	17.2592	3.8666**
PhD + Engineer	(1.0498)	(1692.0576)	(423.3388)	(1.5811)	(1.0715)	(2535.2195)	(730.8564)	(1.7519)
Post 2006 Reform *	0.3759**	0.3891	0.7611***	0.6378**	0.4732**	1.0835**	0.8771**	0.4920
PhD - Engineer Field	(0.1891)	(0.4734)	(0.2926)	(0.3083)	(0.1841)	(0.5005)	(0.3458)	(0.3354)
Post 2008 Reform *	2.1264**	17.4547	13.0977	2.9277**	2.4241***	17.9853	14.9090	2.5590**
PhD - Engineer Field	(0.8394)	(1692.0568)	(423.3378)	(1.1786)	(0.8376)	(2535.2194)	(730.8561)	(1.1489)
Post 2006 Reform *	-0.2113		-0.3821	0.3940	-0.4544		-0.4643	-0.1692
PhD - Other Field	(0.2545)		(0.4196)	(0.7964)	(0.3761)		(0.7256)	(0.9102)

Notes: See notes to table 5. *** p<0.01, ** p<0.05, * p<0.1.

The robustness of the coefficients to the possibility of endogenous education is unsurprising when considering the estimated distributions of unobserved heterogeneity by degree, as presented in table 9. This table shows that although there is relevant unobserved heterogeneity in some cases ($\overline{\nu} \neq 0$), the probability of being a fast or slow type typically does not vary much across degrees. The only job types for which a likelihood ratio test rejects the null hypothesis that all degrees have a common unobserved heterogeneity distribution (i.e. that education is endogenous) are for transitions to all stable classified R & D jobs, with or without professors (P-value=0.0001 for both cases). In these cases, we find that endogenous education may have been biasing upwards the effect of having a PhD of any type, relative to being an engineer, on the speed of job finding since the probability of being a slow-exit type is estimated to be higher for engineers than for PhDs when considering transitions to these types of jobs. For all of the other types of jobs, our results suggest that differences in observable characteristics capture most of the relevant variation in exit rates across degree categories, and that the presence of unobserved heterogeneity only risks biasing the estimates of the baseline hazard and time varying covariates, as noted in section 4.3. The implication, when comparing the results for all jobs that are classified R & D to the results for comparable private sector jobs, is that the unobserved heterogeneity that affects transition rates and is correlated with having a PhD is only relevant for hiring into R & D jobs in the public sector. One possible explanation for this result could be that the networks to which PhDs have access, typically through their degree-granting institutions, can be helpful in getting some graduates public sector R & D jobs rapidly, and that engineers do not have access to the same networks.

Table 9: Parameters of the Unobserved Heterogeneity Distributions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All Stable Jobs				Private Sector Only			
		R & D Classification	R & D Classification			R & D Classification	R & D Classification	
	All Jobs	Without Professors	With Professors	R & D Activities	All Jobs	Without Professors	With Professors	R & D Activities
$\overline{\nu}$	0.9094***	2.9305***	2.6576***	2.1320	1.0879*	1.2417	5.6600	4.5500
	(0.3227)	(0.5675)	(0.7070)	(0.0000)	(0.5618)	(3.4374)	(6.7332)	(3.4853)
$P(\nu = 0 \mid \text{Engineer})$	0.3343	0.7186	0.3820	0.1095	0.1692	0.8770	0.3614	0.3405
$P(\nu = 0 \mid \text{PhD + Engineer})$	0.0369	0.6876	0.3479	0.2529	0.0789	0.6377	0.3656	0.3716
$P(\nu = 0 \mid \text{PhD - Engineer Field})$	0.0219	0.6554	0.3155	0.2486	0.4904	0.6253	0.2864	0.2927
$P(\nu = 0 \mid \text{PhD - Other Field})$	0.0400	0.6241	0.2851	0.2004	0.0965	0.6610	0.3385	0.3634
Log Likelihood	-5405	-866.7	-1864	-1326	-4300	-834.7	-1187	-1255
Weighted Equivalent Observations	11,028	11,028	11,028	11,028	11,028	11,028	11,028	11,028

Notes: See notes to table 5. *** p<0.01, ** p<0.05, * p<0.1.

6 Conclusions

This paper has examined the reasons why engineers find their first stable jobs faster than PhDs in France. After establishing the main stylized facts, including the fact that engineers who continue their studies to complete a PhD take longer to find their first stable job after leaving school than engineers who go straight to the job market after obtaining their degree, several possible explanations are proposed. These include differences in the characteristics of the students, differences in the fields of study, directed search toward public sector research positions (especially professors) and "excessive" reservation wages, perhaps due to the need for compensating differentials in order to get PhDs to accept private sector jobs.

Using proportional hazards duration models, we find empirical support for all of these explanations. Worker characteristics, both observable and unobservable, significantly affect the rate of stable job finding, and there are significant differences in observable characteristics between engineers and PhDs, especially PhDs who do not already have an engineering degree. Some fields of study are associated with longer times to find a stable job, and PhDs without an engineering degree who study the same fields as PhDs who do have an engineering degree tend to find stable jobs faster than those who study other fields, although this result is sensitive to the type of stable job being considered (any job versus private sector-only jobs, R & D jobs with or without professors, etc.). Differences in transition rates appear to be due largely to an advantage that engineers have over PhDs in transitions to private sector jobs, suggesting directed search is relevant. And when considering the impact of a subsidy program that reduced the cost of hiring PhDs in the private sector, we find that bigger subsidies were associated with larger improvements in the speed of job finding for PhDs. It is worth noting that education is not found to be endogenous to the speed of stable job finding in the private sector or for stable jobs overall, once we condition on a large series of covariates that cover educational performance and field of study (among other characteristics), although it may be relevant for finding stable R & D positions in the public sector.

If policy makers wanted to shorten the (relative) time it takes for PhDs to find jobs, our results suggest several options on both the demand and supply side of the labor market. First, on the demand side, if one accepts that job search is targeting public sector professor positions, then policy makers could attempt to accelerate junior hiring for this type of position. Two policies to do this include increasing the overall supply of professor positions and working to change norms that incite PhDs to look for post doctoral fellowships and temporary teaching positions before being able to access stable teaching jobs. Policy makers can also consider strengthening wage subsidies as these have been shown to be effective in increasing the relative job finding rate of PhDs, although this may not be the most cost-effective measure as it risks generating substantial windfall gains for firms in many cases. On the supply side, PhD fellowships could be reallocated toward engineer fields, since this has the potential to affect the share of students with engineer field studies among the pool of PhDs[33], and these students have the best chances of finding jobs in the private sector. A final policy measure that could affect the speed of finding stable jobs would be provide extra information to students in their final years of PhD study about starting salaries in the private sector and the limited opportunities in the public sector. If there is an information problem that leads PhD graduates to have "too high" reservation wages[34], this information could lead students to revise their reservation wages for private sector jobs and make them more likely to accept the offers they get.

[33]The literature on the determinants of the choice of field of study is relatively limited, so it is difficult to assess how large of an effect this might be. See Altonji et al. (2012, 2014); Beffy et al. (2012) for examples.

[34]The estimated effects of the DJD in section 4.2 are consistent with either a correctly defined reservation wage and a compensating wage differential - in which case the current rate of stable job finding in the private sector is individually optimal - or unrealistic beliefs about wages, working conditions and offer arrival rates in the private and public sector.

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A List of Engineer Fields

B Additional Descriptive Statistics

Table A.1: Fields of PhD Study Chosen and Not Chosen by Engineers

PhD Fields Chosen by Engineers	PhD Fields Not Chosen by Engineers
Biochemistry (Chimie-Biologie, biochimie)	Agricultural Production, Specialized Cultures and Agricultural Protection (Productions végétales, cultures spécialisées et protection des cultures)
Chemistry (Chimie)	Business and Sales (Commerce, vente)
Computer Science (Informatique, traitement de l'information, réseaux de transmission des données)	Culture, Sports and Leisure (Animation culturelle, sportive et de loisirs)
Earth Sciences (Sciences de la terre)	Finance, Banking and Insurance (Finances, banque, assurances)
Economics (Économie)	Food and Cooking (Agro-alimentaire, alimentation, cuisine)
Electricity and Electronics (Électricité, électronique)	French Literature and Civilization (Français, littérature et civilisation française)
Energy, climate engineering (Énergie, génie climatique)	History (Histoire)
Fundamental Industrial Technologies (Technologies industrielles fondamentales)	Languages and Ancient Civizations (Langues et civilisations anciennes)
General and Precision Mechanics (Mécanique générale et de précision, usinage)	Law, Political Science (Droit, sciences politiques)
Geography (Géographie)	Linguistics (Linguistique)
Health (Santé)	Modern Languages, Foreign and Regional Civilizations (Langues vivantes, civilisations étrangères et régionales)
Industrial Transformation Technology (Technologies de commandes des transformations industrielles)	Multidisciplinary Agriculture and Agronomic Fields (Spécialités plurivalentes de l'agronomie et de l'agriculture)
Life Sciences (Sciences de la vie)	Mulitdisciplinary Literary and Artistic Fields (Spécialités littéraires et artistiques plurivalentes)
Mathematics (Mathématiques)	Multidisciplinary Social Sciences and Law Fields (Spécialités pluridisciplinaires SH et droit)
Mining, Civil Engineering and Topography (Mines et carrières, génie civil, topographie)	Multidisciplinary Trade and Management Fields (including general business administration and public administration) (Spécialités plurivalentes des échanges et de la gestion (y c. administration générale des entreprises et des coll.))
Multi-Scientific and Multi-Technological Fields (Spécialités pluri-scientifiques, pluri-technologiques)	Music, Performing Arts (Musique, arts du spectacle)
Natural Sciences (Biology-Geology) (Sciences naturelles (biologie-géologie))	Other Multi-disciplinary Artistic Fields (Autres disciplines artistiques plurivalentes)
Physics (Physique)	Philosophy, Ethics and Theology (Philosophie, éthique et théologie)
Physics and Chemistry (Physique-chimie)	Psychology (Psychologie)
Urban Development (Aménagement du territoire, développement, urbanisme)	Social Sciences, Including Demography and Anthropology (Sciences sociales (y c. démographie, anthropologie))
	Social Work (Travail social)

Table B.1: Descriptive Statistics, Standard Deviations in Parentheses

	Overall Mean	Engineers	PhD + Engineer	PhD - Engineer Field	PhD - Other Field
Region of Higher Education Institution					
Champagne-Ardennes	0.030	0.037	0.000	0.023	0.001
	(0.1692)	(0.1883)	(0.0000)	(0.1507)	(0.0368)
Picardie	0.003	0.000	0.000	0.006	0.011
	(0.0500)	(0.0000)	(0.0000)	(0.0758)	(0.1047)
Haute-Normandie	0.008	0.007	0.000	0.010	0.010
	(0.0885)	(0.0832)	(0.0000)	(0.0988)	(0.0982)
Centre	0.038	0.043	0.009	0.035	0.018
	(0.1920)	(0.2036)	(0.0940)	(0.1836)	(0.1344)
Basse-Normandie	0.020	0.024	0.010	0.016	0.003
	(0.1395)	(0.1530)	(0.0975)	(0.1260)	(0.0519)
Bourgogne	0.014	0.010	0.009	0.023	0.015
	(0.1189)	(0.0992)	(0.0940)	(0.1493)	(0.1221)
Nord-Pas de Calais	0.078	0.096	0.028	0.055	0.035
	(0.2678)	(0.2949)	(0.1653)	(0.2280)	(0.1828)
Lorraine	0.055	0.067	0.025	0.040	0.016
	(0.2272)	(0.2508)	(0.1573)	(0.1956)	(0.1264)
Alsace	0.038	0.040	0.106	0.035	0.019
	(0.1923)	(0.1951)	(0.3082)	(0.1837)	(0.1372)
France Comté	0.017	0.019	0.007	0.015	0.002
	(0.1276)	(0.1365)	(0.0825)	(0.1229)	(0.0493)
Pays de la Loire	0.050	0.054	0.029	0.048	0.022
	(0.2175)	(0.2263)	(0.1673)	(0.2145)	(0.1455)
Bretagne	0.027	0.016	0.041	0.046	0.031
	(0.1629)	(0.1270)	(0.1986)	(0.2091)	(0.1729)
Poitou-Charentes	0.027	0.026	0.034	0.030	0.018
	(0.1616)	(0.1576)	(0.1820)	(0.1715)	(0.1344)
Aquitaine	0.044	0.041	0.014	0.049	0.048
	(0.2042)	(0.1988)	(0.1163)	(0.2166)	(0.2146)
Midi-Pyrénées	0.044	0.042	0.047	0.052	0.022
	(0.2055)	(0.2007)	(0.2123)	(0.2218)	(0.1481)
Limousin	0.014	0.016	0.000	0.013	0.003
	(0.1185)	(0.1269)	(0.0000)	(0.1150)	(0.0569)
Rhone-Alpes	0.121	0.126	0.136	0.109	0.133
	(0.3262)	(0.3316)	(0.3433)	(0.3118)	(0.3397)
Auvergne	0.043	0.054	0.010	0.030	0.010
	(0.2024)	(0.2267)	(0.1009)	(0.1700)	(0.0995)
Languedoc-Roussillon	0.039	0.027	0.034	0.058	0.053
	(0.1929)	(0.1621)	(0.1802)	(0.2342)	(0.2241)
PACA	0.074	0.057	0.123	0.093	0.122
	(0.2618)	(0.2324)	(0.3282)	(0.2903)	(0.3270)
Corse	0.001	0.000	0.003	0.001	0.003
	(0.0250)	(0.0000)	(0.0523)	(0.0353)	(0.0519)

Source: Génération 2004.

	Overall Mean	Engineers	PhD + Engineer	PhD - Engineer Field	PhD - Other Field
Father's Occupation					
Farmer	0.021	0.028	0.011	0.008	0.015
	(0.1419)	(0.1656)	(0.1042)	(0.0895)	(0.1200)
Blue Collar	0.057	0.071	0.049	0.039	0.020
	(0.2316)	(0.2562)	(0.2167)	(0.1928)	(0.1391)
Low-Level Employee	0.082	0.098	0.025	0.064	0.039
	(0.2745)	(0.2974)	(0.1573)	(0.2455)	(0.1948)
Technician, Supervisor,	0.096	0.117	0.101	0.064	0.050
Intermediate Profession	(0.2941)	(0.3211)	(0.3011)	(0.2456)	(0.2180)
Manager, Engineer,	0.429	0.422	0.385	0.453	0.379
Professional, Professor	(0.4949)	(0.4939)	(0.4866)	(0.4978)	(0.4851)
Artisan, Self-Employed,	0.080	0.089	0.042	0.069	0.069
Owner	(0.2718)	(0.2845)	(0.2018)	(0.2538)	(0.2543)
Do not know	0.011	0.014	0.005	0.007	0.004
	(0.1040)	(0.1173)	(0.0691)	(0.0832)	(0.0656)
Mother's Occupation					
Farmer	0.008	0.011	0.009	0.002	0.009
	(0.0901)	(0.1052)	(0.0940)	(0.0478)	(0.0968)
Blue Collar	0.031	0.037	0.010	0.026	0.003
	(0.1722)	(0.1879)	(0.1009)	(0.1585)	(0.0569)
Low-Level Employee	0.275	0.324	0.117	0.224	0.111
	(0.4463)	(0.4682)	(0.3210)	(0.4167)	(0.3143)
Technician, Supervisor,	0.054	0.058	0.077	0.045	0.048
Intermediate Profession	(0.2254)	(0.2336)	(0.2674)	(0.2074)	(0.2141)
Manager, Engineer,	0.248	0.245	0.313	0.240	0.300
Professional, Professor	(0.4320)	(0.4301)	(0.4637)	(0.4272)	(0.4583)
Artisan, Self-Employed,	0.022	0.027	0.032	0.013	0.008
Owner	(0.1456)	(0.1629)	(0.1766)	(0.1135)	(0.0867)
Do not know	0.008	0.009	0.000	0.008	0.012
	(0.0906)	(0.0919)	(0.0000)	(0.0872)	(0.1109)

Source: Génération 2004.