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► **To cite this version:**

Claire Bonnard, Julien Calmand, Jean-François Giret. International mobility of French Ph.D.s. European journal of higher education, 2017, 7 (1), pp.1 - 13. 10.1080/21568235.2017.1257479 . halshs-01447878

**HAL Id: halshs-01447878**

**<https://shs.hal.science/halshs-01447878v1>**

Submitted on 19 Apr 2022

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## International mobility of French Ph.D.s

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Claire Bonnard, Julien Calmand & Jean-François Giret (2017)  
International mobility of French Ph.D.s, *European Journal of Higher Education*, 7:1, 43-55, DOI: [10.1080/21568235.2017.1257479](https://doi.org/10.1080/21568235.2017.1257479)

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### ABSTRACT

This research investigates the determinants of international mobility of Ph.D.s upon graduation. It is based on a survey of 400 young Ph.D.s who graduated in France between 2003 and 2008, half of whom were still abroad more than six years after graduating. The impacts of personal, occupational and scientific characteristics on the successive mobility decisions after graduating were scrutinized. The findings show that motivations for going abroad relate principally to the difficulty in finding employment on the French labour market. The choices as to longer term expatriation are more fragmented and can be less readily unravelled. By contrast, readiness to return to France is often accounted for by family factors.

### KEYWORDS

International mobility; higher education; academics; academic employment

## 1. Introduction

The expatriation of graduates prompts a good deal of debate in developing and developed countries alike. It is often associated with the brain drain and entails a danger for countries that they will lose the skills required for their economies to be competitive. For expatriates, going abroad may by contrast turn out to be a real opportunity in terms of their careers (Saint-Paul 2004). The issue is of particular concern for Ph.D.s because in many OECD countries, certain scientific disciplines have largely encouraged people to travel abroad in particular for post-doctoral studies. According to an international survey implemented by an European consortium (IDEA consult 2013), around 30% of researchers were mobile for 3 months or more in the last 10 years following their Ph.D. graduation. While some young Ph.D.s return to their home country upon completing their post-doctoral courses, others remain abroad and join research centres, universities or firms in their host countries. However, there is little information about the numbers of expatriate Ph.D.s and their motives and career plans. By definition, surveys conducted in France such as the 'Generation' surveys of the Centre d'études et de recherches sur les qualifications (Céreq) do not question young Ph.D.s abroad. A 1996 Céreq estimation put the number of Ph.D.s still abroad three years after graduating at 7% (Martinelli 2002). However, the subsequent boom in post-doctoral courses, the growing difficulties for Ph.D.s in France on the labour market, and the growing internationalization of the scientific labour market all suggest that their numbers are currently underestimated. The report by the Observatoire de l'Emploi Scientifique (2009), taking up the findings of a CEPI researcher for the United States, is nuanced about the importance of expatriation for French researchers. The number of French Ph.D.s having emigrated to the United States between 1991 and 2000 and currently doing research there amounts to less than 1.5% of French researchers. Although this figure is up on that for the 1980s, France reportedly has the lowest ratio of any European country (Tritah 2008).

Apart from the actual number of expatriate Ph.D.s, there is also the question of the motives for going abroad and future career plans. In public debate in France, there are two partly contradictory lines on these issues that bring out the limitations of higher education and the research sector. The first often concludes that the French system is unable to hold on to and make use of

its finest minds<sup>1</sup>. For various reasons France supposedly has difficulty in keeping its star scientists after training them (Kohler 2010). As suggested by Saint-Paul (2004) in the French case, the economic consequences of the brain drain could be considerably more negative if the expatriates are the most talented individuals. These key individuals are supposed to play a decisive role in the country's potential for growth and innovation. The second line of argument criticizes what is seen as an overly theoretical doctoral education in France that is disconnected from the needs of the knowledge economy. The system allegedly fails to provide highly qualified personnel capable of developing the national capacity for innovation. However, it may also be asked to what extent international mobility is related to the difficulties of Ph.D.s finding a place in the French labour market (Calmand and Giret 2013). Unemployment for recent Ph.D. graduates in France is sensibly higher than in other developed countries (Harfi and Auriol 2010). The scientific literature addresses these issues on the basis of migration theory, focusing especially on push and pull factors that might explain Ph.D.s' individual mobility motives (Dongbin, Bankart, and Isdell 2011). This approach is favoured in this study, which aims to understand the determinants behind foreign mobility after obtaining a Ph.D. in France and then returning to France or remaining abroad three years after graduating. This research looks to provide some answers on the basis of a survey of 400 young Ph.D.s in France who graduated between 2003 and 2008 and having been abroad for more than three months after Ph.D. graduation. If the first mobility experience is generally a post-doc position, it can also correspond to other labour contracts. Our paper mainly focuses on academic mobility although early international mobility (prior and during the Ph.D.) may influence the subsequent mobility.

The first section uses a review of the literature on the motives that may affect the international mobility of Ph.D.s, notably in the French case. Section 2 presents the survey and looks at factors that might explain the decision of young Ph.D.s to move abroad and to return. The third section concentrates on the possible trajectories of young Ph.D.s having moved abroad. The aim is to understand why some of them decide to stay abroad longer than they initially intended.

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<sup>1</sup> The most often cited example is that of Gérard Debreu, the 1983 winner of the Nobel Prize for economics after becoming a US citizen in 1975, who was sorely disappointed by the French university system

## 2. An analysis of the determinants of international mobility

Compared with other areas of employment of highly qualified personnel, in research occupations, international mobility is considered to be the norm for integration and occupational socialization (Mahroum 2000). Unlike in other sectors such as trade and industry, financial motives only partially drive mobility in this area. Scientific considerations and the prestige of the host institutions appear to prevail. However, it may be thought that the reasons for this type of mobility remain fairly diverse for young Ph.D.s looking for steady work on the labour market. For some of them, the aim is to return to their home countries and find tenured employment on the academic labour market (Musselin 2004). Doing a post-doc, implying in most instances spending time abroad, is thought of as a 'near' requirement in some scientific disciplines for young Ph.D.s to get into research and enhance their résumés. Occupational and scientific interest and the absence of a buoyant labour market in France are reasons for such mobility. The influence of various professional or personal factors may, however, change over the course of the young Ph.D.'s career and explain a return to France or continued expatriation.

Comparative studies of the insertion of young Ph.D.s in various developed countries emphasize how sluggish the French labour market is (Auriol, Misu, and Freeman 2013; Harfi and Auriol 2010). Whereas the unemployment rate of young Ph.D.s three years after graduating was less than 2% in the United States in 2003, it stood at more than 10% over almost the same period in France. There are many explanations for these hardships and they are not exclusive. For one thing, as in many countries, young Ph.D.s wish to embark on academic careers; the Céreq surveys in France report that 70% of them give precedence to an academic career in the years after completing their Ph.D.s. However, unlike what happens in many countries, in France researchers or teaching and research staff find academic tenure very early on, in the few years after completing their Ph.D.s, and very seldom later on (Musselin 2000). For another thing, recruitment in the non-academic sector, in R&D or outside R&D, is not favourable to young French Ph.D.s who are often in competition with graduates from the grandes écoles. This is particularly so in R&D where corporations prefer to recruit young engineers who are thought to be more versatile (Beltramo, Paul, and Perret 2001). Lastly, in other sectors in France, unlike in countries such as Germany, obtaining a Ph.D. is not seen as a

prestigious achievement that is recognized in the career structure.

The difficulties encountered on the French labour market are not the only professional reasons that motivate young Ph.D.s to be internationally mobile. Experience abroad is also a way of enhancing their scientific and non-scientific skills and networks, which Bozeman and Corley (2004) define as scientific and technical human capital, including in it in particular the social skills required in research and innovation circles. In addition to providing an opportunity to perfect their foreign language skills, generally in English, post-doctoral periods allow young Ph.D.s to experience other working environments and to develop new research themes, new methods, new tools, and new empirical areas of study. By joining what are sometimes very different forms of research organization, they have to cope with new working environments and often autonomously. Kyvik, Karseth, and Blume (1999) identify three factors in the case of Norwegian Ph.D.s who went abroad to do research courses: direct aid in their research in terms, for example, of their fields of enquiry, the acquisition of new skills and knowledge, and more personal development such as proficiency in a foreign language or self-confidence.

However, the question arises as to how such mobility is managed by employers and the public sector in these different countries. The contribution of these new skills upon returning to France is a factor that may encourage innovation and research if incentives to leave and then to return are consistent (Cañibano 2006). The boom in post docs is not uniform, however, across the various disciplines and forms part of the scientific and technological development specific to each sector. Thus the transformation of research in biology, with the development of biotechnologies and research/industry relations has promoted the emergence in France of non-permanent jobs in research laboratories in the form of post docs (Brunet 2007). Such post docs have become a requirement in these disciplines before steady employment in research circles can be found. Moreover, the question of the post-doc signal for access to academic careers is also important. The prestige of the host institution is a factor that has drawing power and may also explain the motives for going abroad or for not returning to France after the experience. It is decisive in scientific production, for example, through membership of prestigious research centres or partnerships in publications. Capacities for research and innovation in the host country will be decisive.

Forced mobility of young Ph.D.s is often related to the difficulty in finding employment in their home countries upon graduating (Morano-Foadi 2005). It is important to look into the consequences of a post-doc stay abroad for

access to employment in France. Despite the advantages in terms of signal and human capital, going abroad may contribute to the severing of the young Ph.D.s' ties with the national employment market and so to the loss of their social capital. This is related in part to the characteristics of the academic sector in France, where most recruitment is done locally in the form of lecturing positions (Godechot and Louvet 2010). Loss of contact may mean young researchers who have been abroad are deprived of valuable information about employment opportunities. Research findings in the academic sector (Bonnal and Giret 2010) and the private sector (Recotillet 2007) relativize, though, the adverse effects of post docs on the careers of researchers or teaching and research staff in France and even indicate positive effects in some disciplines.

### 3. The motivations for young people to go abroad: lessons from a survey on Ph.D. graduates in France

The empirical part of this research is based on a survey of 400 Ph.D.s across all disciplines having been abroad for occupational reasons for more than three months. They obtained their Ph.D. in France between 2003 and 2008 and were surveyed in the second semester

2012.<sup>2</sup> Three years after Ph.D. graduation, 57% of them are abroad. At the time of survey, 41% are still living abroad.<sup>3</sup> Part of the questionnaire is related to the determinants of international mobility and the skills developed by the Ph.D.s in their various jobs. The survey also collated information about the individual and social characteristics of young Ph.D.s, their disciplines,<sup>4</sup> publications at the time they graduated, financing, career path and geographical background upon completing their Ph.D. Information on the characteristics of the host country was also included in the data base for a better understanding of the mobility process. This survey is valuable in describing the process of international mobility after the Ph.D. but also for identifying the main factors explaining that mobility. The 400 Ph.D.s who responded to the survey had lived abroad for professional reasons for more than

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<sup>2</sup> They were questioned via an on-line survey conducted by Céreq and IREDU with support of APEC based on information collated from doctoral schools and Ph.D. associations.

<sup>3</sup> Ph.D.s were interviewed about their situations three years after graduation and at the time of the survey. We do not have complete longitudinal information on their trajectory.

<sup>4</sup> Table A in appendix presents the distribution by field of study.

three months on at least one occasion. This mobility may initially correspond to post-doctoral position; it is the case for 80% of them. However, some of them are directly recruited in permanent position. As Kelo, Teichler, and Wächter (2006) emphasize, the different types of international mobility are complex to define and do not provide the same measurement depending on whether, for example, we are interested in foreign students or students who experience international mobility in the course of their higher education. Our survey concerns Ph.D. students who graduated in France and then spent time abroad. Among the foreign students, only those who did not go back to their home country were kept in the sample, which amounted to about 6% of the final sample. On the contrary, foreign students who completed their Ph.D. in France and returned to their home country were excluded from the analysis. It corresponds to return mobility associated with specific strategies (Teichler 2015).

Table 1, on Ph.D.s who were working abroad three years after graduating, proposes a first glimpse of the diversity of reasons for going abroad. The difficulties of young Ph.D.s on the labour market stands out as the main reason for going abroad. Leaving is explained for more than two in three young Ph.D.s by difficulties in finding a position in France at the start of their careers.<sup>5</sup> Next, the need to obtain professional experience abroad is a factor for 66% of Ph.D.s. Scientific reasons are also involved in the decision to go abroad for more than one in two young Ph.D.s, but they do not feature as the main reason.

These initial observations nuance the hypothesis of a brain drain, with expatriation being for most young Ph.D.s a default choice, often forced on them by the shortage of jobs in the French labour market for higher education and research.

By construction the survey provides more precise information about the geographical position of Ph.D.s three years after graduating and then at the time of the survey. Three years after graduating 57% of Ph.D.s in the sample were living abroad, and more than one in three of them in the USA and the UK. For Ph.D.s born abroad, 76% were no longer in France after three years. At the survey date, on average six years after graduating, about half of Ph.D.s were expatriates (62% for those born abroad). The occupational status of these young people was rather favourable. Close to 92% of young Ph.D.s were in employment at the date of the survey. Stability in that

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<sup>5</sup> This is also the case for the decision to stay abroad more than three years after completing their Ph.D.



employment differed, however, even if it is difficult to compare employment contracts between different countries. Fewer than one in two young people abroad at the time of the survey had any kind of tenure compared with 80% for those Ph.D.s who had returned to France. The share of academic employment was slightly greater for Ph.D.s who had returned to France (81%) than for others (68%), who were by contrast more often employed in R&D.

We characterize young people's academic profiles and motivations in terms of their

geographic mobility. The survey identifies three groups: young people who returned to France within three years of graduating, those abroad three years after graduating but who subsequently returned to France, and expatriates, those still abroad at the date of the survey.

Table 1. Motivations for going abroad (%).

Motivations	Little if any influence	Moderate influence	Main influence	Total
Need to have experience abroad	34	28	38	100
Difficulty finding a position in France	35	21	44	100
Better scientific conditions	40	29	31	100
Career advantages	42	25	33	100
Family and personal reasons	63	18	19	100

Source: Iredu-Cereq survey.

The first group comprises Ph.D.s who had a comparatively short stay abroad. They have a fairly specific profile in terms of individual characteristics and academic and professional careers. Their academic career path is one in which the post-doc is just a temporary stage before taking up steady employment as a researcher or teaching and research staff. Most graduated in mathematics and physics and typically had a higher number of publications at the time they graduated, especially in foreign journals. More than half prepared their thesis work in three years and 90% in less than four years. They were also the most numerous at the time of graduating to plan working at university or in research and to have been employed as teaching staff during their Ph.D.s. A further indication of

their wish to return to France rapidly is that most had applied for accreditation by the Conseil National des Universités (CNU)<sup>6</sup> after their thesis and had been almost systematically accepted.

The second group is made up of Ph.D.s who were still abroad three years after graduating. Their academic profile is similar to that of the previous group. Most received some form of public financing for their Ph.D. and did short theses, but more commonly in the life and earth sciences. Again very many of them, almost 80%, planned to work in academia or in research. They had a high level of scientific output, too, comparable with the first group in terms of the number of publications but, paradoxically, many had published less often in foreign journals. Very many of them had applied for national accreditation after graduating, which again was indicative of their wish to remain in France.

The third group, Ph.D.s still abroad at the time of the survey, stands more clearly apart from the previous ones. First the proportion of Ph.D.s born abroad<sup>7</sup> is higher than in the other groups, which can be understood by the greater propensity to mobility of young people who have already had experience of mobility. In addition, they are more often male and the geographical areas frequented are more diverse (the proportion of Ph.D.s in Europe and North America is lower). Their career paths are less academic. Fewer than half had held temporary teaching positions, they had fewer publications at the time of graduating, and 20% fewer had done post-doc work. At the time of graduating, they were more numerous to want to work in research in business and their research positions were less often in the public sector. Only one in three of this group applied for CNU accreditation after graduating versus more than 70% in the other groups. In terms of their occupational position, three years after graduating, and at the time of the survey, there were as many of them in employment as their counterparts in France but far fewer in academic employment and fewer in tenured positions, being more often in non-tenured employment and post-doc work. The effect of the different characteristics on the process of Ph.D. mobility can be tested more stringently by a *ceteris paribus* analysis. We analysed living and working abroad three years after graduating and then still being abroad at the survey date on the basis of individual characteristics and motivations and the host country (Table 2), and the characteristics of the host country

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<sup>6</sup> This national qualification is a requirement for applying for positions as teaching and research staff in public-sector universities in France.

<sup>7</sup> As previously mentioned, foreign students who returned to their home country were excluded.

(Table 3).

The results of estimations concerning individual characteristics (Table 2) emphasize the difficulty in predicting the movements of young Ph.D.s living abroad. Certain information may, however, provide an idea as to the motivations behind their chosen paths. Not applying for CNU accreditation upon graduating as a first step to securing an academic position in France seems to reveal that young Ph.D.s wish to be mobile. They are more often found abroad three years after graduating or at the survey date. The role of publications, which may be a signal of the Ph.D.s scientific quality, shows that Ph.D.s who had published little if at all at the time of graduating were slightly more likely to be abroad at the date of the survey. In other words, expatriation seems to concern Ph.D.s who published little.

Table 2. Probability of living abroad as a function of young Ph.D.s' characteristics and motivations.

	Abroad three years after Ph.D.	Abroad at date of survey
Men (ref. women)	0.08	-0.02
Born abroad	0.43	0.35
Has children	0.05	-0.02
Father management level (ref. others)	0.45***	0.01
Not known	-0.42*	-0.56
Year of Ph.D. ref. 2003–2004		
2005–2006	-0.27	-0.41
2007–2008	0.05	0.06
Discipline ref. Math-Physics		
Earth and Life Sciences – Health	0.11	-0,2
Economics – Law – Literature	0.43**	0.02
Publications at graduation ref. 2–3 publications		
0–1 publication	-0.20	0.54**
4 or more publications	-0.39*	0.41
CNU accreditation for academic employment in France	-0.48***	-0.65**
Not proficient in country's language	0.72***	0.06
Post-doctoral fellowship	0.03	-0.30
Motivations for leaving <sup>8</sup>		
Experience abroad		-0.91***
Difficulty in finding position		0.59**
Scientific conditions		0.10
Career advantages		0.52*
Personal reasons		-0.12
Situation three years after graduating ref. Unemployed		
In academic employment		0.03
In non-academic employment		0.45
Host countries ref. Others		
Germany	-0.18	0.48
UK	0.27	-0.59*
Canada	-0.03	0.37
USA	-0.05	-0.07

<sup>8</sup> Only young Ph.D.s abroad three years after completing their Ph.D.s were questioned about their motives for leaving. Ph.D.s who returned to France less than three years after graduating did not answer the question because of the way the survey was constructed.

Constant	0.23	0.87
N	336	199

Table 3. Probability of living abroad at the date of the survey depending on country characteristics.<sup>9</sup>

	Abroad at the survey date
Global innovation index	++
Public spending on education (% GDP)	++
Per capital GDP	++
Stock of international migrants (% population)	+++
R&D spending (% GDP)	+++
Researchers in R&D	+++

Notes: +++, ++, + positive impact of variable significant respectively at 1, 5, and 10%. Each variable was introduced separately instead of the host country in the estimation in Table 2 column 2. Individual characteristics introduced but not shown are the same as in Table 2.

The discipline-related effect can be explained by professional strategies in the exact sciences, which are overrepresented in the sample. They are far more likely to experience international mobility but for a shorter period than other Ph.D.s. Conversely, our findings show that Ph.D.s in the human and social sciences are more likely to be abroad still three years after graduating. It might have been expected that the host country would have an impact on expatriation but this is virtually never the case excepted for UK. For example, the United States does not seem to hold on to French Ph.D.s any more than other countries. Individual characteristics are also barely discriminatory *ceteris paribus*.<sup>10</sup> Children of managerial- level parents were slightly more likely to be abroad three years after graduating, which may be because of an effect associated with financial resources or cultural capital, but the effect was no longer significant at the date of the survey. The effect of the Ph.D.'s nationality is not significant, all else being equal. Gender differences do not affect mobility strategies either, whereas it might have been hypothesized that men would be abroad for longer.

Initial motives for going abroad seem, however, to determine the final

<sup>9</sup> The Global innovation index is taken from the Global Innovation Index 2014 report. Other indicators are from World Bank data.

<sup>10</sup> Certain variables such as the type of financing for the Ph.D. or the wish to work in research at the time of graduating were introduced into the analysis and then removed because not significant.

situation more closely. Ph.D.s whose motivation was mainly to gain experience abroad in their career strategy are less likely to be expatriates. The result is the opposite for those Ph.D.s whose motives were the difficulty in finding a position in France and to lesser extent career advantages abroad. The difficulties that prompted them to leave France after their Ph.D. are also a curb on returning at the time of the survey. By contrast, scientific conditions abroad do not seem to influence Ph.D.s' choice to remain abroad. In addition, going abroad for post-doctoral position have any impact on the duration of expatriation.

The results presented in Table 3 summarize the impact of the host country characteristics. Variables relating to research, innovation, or education in the host country have replaced the countries in the previous estimation. As these variables are closely correlated with each other, they were introduced separately but jointly with the individual characteristics. In accordance with the literature on the brain drain (Docquier and Rapoport 2012), the results highlight the effect of certain characteristics of the host country. For long stays, expatriation is more important when innovation and R&D are developed in the host country and the country has a substantial tradition of immigration. The results also highlight the hypothesis of upward mobility of Ph.D. graduates (Teichler 2015), they move to a more favourable economic and scientific country. It is interesting to observe, however, that none of these host-country-related variables significantly accounts for Ph.D.s staying abroad three years after graduating. In other words, only comparatively long expatriation (six years) seems to depend on host country characteristics.

#### 4. Desired mobility versus actual mobility

One of the challenges for the countries of origin of Ph.D.s is to come up with incentives for them to return after their experience abroad. The survey makes it possible to compare the mobility project as it was initially intended and the actual mobility of young Ph.D.s. They were asked more specifically about how long they had planned to stay abroad at the time when they first left.<sup>11</sup>

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<sup>11</sup> More precisely, Ph.D.s were asked on the number of months they expected spend abroad before their mobility. As the survey was retrospective, it may be that young Ph.D.s reformulate their initial projects ex post and under- or overestimate the length of time they planned to spend abroad. However, it is difficult to determine whether there is such a bias and its direction.

Table 4. Expected length of stay abroad (before leaving).

Expected stay (months)	Ph.D.s who returned to France	Expatriate Ph.D.s
First quartile	12	24
Median	24	36
Third quartile	36	50

Source: Iredu-Céreq survey.

Table 5. Change of the initial plan to go abroad depending on initial motivations for leaving.

	Changed initial plans (74%)	Did not change initial plans (26%)	Total
Motivations for going abroad	(%)	(%)	(%)
Difficulty finding a position in France	79	21	100
Better scientific conditions	80	20	100
Career advantages	73	27	100
Need to gain experience abroad	83	17	100
Family and personal reasons	64	36	100

Note: 83% of Ph.D.s who went abroad changed their initial plans when the move was influenced by the desire to gain experience abroad (versus 74% on average, for all Ph.D.s who went abroad).

Table 4 shows that expectations were quite consistent with the position at the date of the survey since Ph.D.s who had returned to France by that date had anticipated a shorter median length of stay abroad than expatriates of 24 versus 36 months.

Tables 5 and 6 provide information on the causes that may explain a change of plan by young Ph.D.s by identifying those who stayed abroad for longer than they expected to when they first left. On average, Table 5 shows that 74% of young expatriates at the date of the survey had changed their plans and had therefore spent longer abroad than initially planned. However, this rate changes with the motivations for leaving: it is even higher when they left to gain experience abroad (83%). However, it is lower when they left for personal reasons (64%). Moreover, Table 6 shows that expatriate Ph.D.s tend to remain abroad longer than planned when the difficulties of returning to France can be explained by difficulties in finding employment.

As in the previous section, the effect of these variables and the effect of individual characteristics can be analysed *ceteris paribus*. We examined the plans of young Ph.D.s before leaving in two steps. A linear regression of the expected time abroad was used first to identify the factors that may explain how the plan to move is formed (Table 7 column 1). Then a probit model was estimated to explain the change from the initial plan. The

endogenous variable took the value 1 if the Ph.D. changed plans and stayed abroad longer than planned, and 0 otherwise (Table 7 column 2). In this instance, only Ph.D.s working abroad were concerned by the question. The findings show first that individual characteristics and host countries have little impact, as before. Motivations, on the other hand, do seem to have more structuring effects on the hoped for duration of stay as on staying abroad longer than planned. Ph.D.s hoping to work in research at the time of graduation and those who left to gain experience abroad expected a shorter stay abroad.

Table 6. Change of the initial plans to go abroad depending on motivations justifying still being abroad at the survey date.

	Changed initial plans (74%)	Did not change initial plans (26%)	
Motivations relating to expatriation	(%)	(%)	Total (%)
Difficulty finding a position in France	83	17	100
Better scientific conditions	79	21	100
Career advantages	76	24	100
Family and personal reasons	70	30	100

Note: 83% of Ph.D.s who moved and were resident abroad at the survey date changed their initial plans when continued expatriation was motivated by the difficulty in finding a position in France (versus an average of 74% for all Ph.D.s who went abroad).



Table 7. Planned versus actual length of stay Planned stay abroad

	Planned stay (months)	Extension of stay relative to planned length
Host countries ref. Others		
Germany	-7.62	-0.72
UK	11.76	-0.33
Canada	31.21	-0.30
USA	32.89	-0.54
Male	14.25	-0.53
Born abroad	50.93*	0.40
Year of PhD ref. 2003–2004		
2005–2006	-30.68	-0.27
2007–2008	-10.64	-0.04
Discipline ref. Math-Physics		
Life and Earth Sciences – Health	9.93	-10.49
Economics – Law – Literature	-0.18	0.68
Publications at graduation ref. 2 – 3		
0 – 1 publication	35.11**	-0.53
4 or more publications	-3.34	-0.01
CNU accreditation for academic employment in France	17.35	-0.31
Wanted to go into research during doctoral studies	-74.13**	0.19
<b><u>Motivations for leaving:</u></b>		
Experience abroad	-46.41**	0.73**
Difficulty in finding position	-7.86	-0.61
Scientific conditions	-6.11	0.72*
Career advantages	12.87	-0.68*
Personal reasons	34.51**	-0.72*
<b><u>Reasons for not returning:</u></b>		
Difficulty in finding position		0.91**
Scientific conditions		-0.33
Career advantages		0.34
Personal reasons		-0.02
Constant	120.74***	1.22
N	199	131

Source: Iredu-Céreq survey.

Notes: Column 1 shows the results of OLS regression on the number of months young people expected to spend abroad before leaving (a positive sign increases the number of months if significant). Column 2 shows the determinants of extending actual stays abroad compared with the planned length (probit model). Significance levels: \*\*\* 1%, \*\* 5%, \* 10%.

It can be supposed that these Ph.D.s went abroad primarily to enhance their résumé and wished to return to France rapidly, which is consistent with the need not to become cut off from the national networks in order to find academic employment in France. Conversely, Ph.D.s with no publications at the time of graduating anticipated staying abroad longer as did those who left for personal reasons. Those motivations also affected the change to their plans. Going abroad to gain experience or to look for better scientific conditions may lead on to remaining slightly longer than planned whereas personal reasons or career advantages prompt them not change their career plans. Lastly expatriate Ph.D.s also modify their plans when they think that it would be difficult for them to find a position in France or because they have found academic work abroad.

## 5. Conclusion

This study investigated the motivations for international mobility of young Ph.D.s in France. If student mobility is generally well documented, few are known in the literature about the mobility on researchers and scholars (Cavalli and Teichler 2015). The boom in post docs in recent years has led in certain disciplines to ever more frequent periods spent abroad after graduating. Some Ph.D.s return rapidly to France to try to find steady employment whereas other extend their time abroad and settle in their host countries. The survey of young Ph.D.s in France shows that it is difficult to liken such foreign stays to the generalized 'brain drain' phenomenon because, for example, professional conditions may be far more attractive or the scientific environment more stimulating. Most young Ph.D.s go abroad because they find it difficult to secure employment in France. This is often also why they extend their stay abroad. That does not mean that the situation abroad is not attractive to young Ph.D.s. More than half of them indicate that scientific conditions influenced their choice to move. Moreover, Ph.D.s tend to remain in the countries that have substantial R&D capacities and a tradition of immigration. It may be thought that recruitment strategies of certain host countries play a decisive role in international mobility (Tremblay 2005). Policies for managing such mobility for home countries are also important, especially by providing incentives for young Ph.D.s who have gone abroad to return. It would be interesting in this context to examine more specifically how networks of young expatriates are built up throughout their careers and prove

decisive for their further careers (Burris 2004). Our findings might usefully be extended by re-questioning the Ph.D.s surveyed. On average, young Ph.D.s were questioned six years after graduating, which is still insufficient to determine whether some will not again change their mobility strategies. In many countries stabilization in academic employment, notably through securing tenure, occurs much later on in their careers than it does in France.

## Notes

1. .
2. They were questioned via an on-line survey conducted by Céreq and IREDU with support of APEC based on information collated from doctoral schools and Ph.D. associations.
3. Ph.D.s were interviewed about their situations three years after graduation and at the time of the survey. We do not have complete longitudinal information on their trajectory.
4. Table A in appendix presents the distribution by field of study.
5. This is also the case for the decision to stay abroad more than three years after completing their Ph.D.
6. This national qualification is a requirement for applying for positions as teaching and research staff in public-sector universities in France.
7. As previously mentioned, foreign students who returned to their home country were excluded.
8. Certain variables such as the type of financing for the Ph.D. or the wish to work in research at the time of graduating were introduced into the analysis and then removed because not significant.
9. More precisely, Ph.D.s were asked on the number of months they expected spend abroad before their mobility. As the survey was retrospective, it may be that young Ph.D.s reformulate their initial projects ex post and underor overestimate the length of time they planned to spend abroad. However, it is difficult to determine whether there is such a bias and its direction.
10. Only young Ph.D.s abroad three years after completing their Ph.D.s were questioned about their motives for leaving. Ph.D.s who returned to France less than three years after graduating did not answer the question because of the way the survey was constructed.
11. The Global innovation index is taken from the Global Innovation Index 2014 report. Other indicators are from World Bank data.

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## Appendix

Table A: Mobility by field of study.

	Not abroad three years after (145)	Abroad three years after (192)	Abroad at date of (138)	All (337)
Life and Earth Sciences – Health	36.6	42.2	38.4	39.8
Economics-Law – Literature	12.4	18.8	18.8	16
Math-Physics	51	39	42.8	44.2
All	100	100	100	100