

## THE LABOUR MARKET ENTRY AND MOBILITY OF YOUNG FRENCH PhDs

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### 1. The market for PhDs is shifting

#### 1.1 *Most higher education streams are expanding, but not the number of doctoral theses*

The number of French secondary-level students to obtain their *baccalauréat* has increased considerably since the early 1980s, including a majority of *bac*-aged persons in the most recent cohorts. The government has promoted access to the *baccalauréat*, while families, students and businesses have also encouraged this rise in the level of initial education. Virtually everyone obtaining a *bac* in general or technological studies now goes on to higher education (HE). Along with increased enrolments for the first cycle of further studies have come an improved examination success rate and an increase in the average length of study. A larger percentage of graduates of IUTs (“University Institutes of Technology”) and STSs (“Advanced Technician Sections”) are going on to university. The development of first-cycle studies has led to a vast increase in the number other HE streams. Graduates from short HE tracks have doubled since 1980, while those from long HE streams have quadrupled. Thus, in 1996, 287 000 graduates completed HE, versus 110 000 in 1980.

The rise in the number of university graduates has been especially sharp. Between 1984 and 1996, the number of students approaching the labour market after completing second- and third-cycle university studies more than tripled, from 38 000 to 120 000. The number of university graduates in the “hard” and natural sciences has grown continuously, especially in third cycles. In fact, in those areas of study there are more third-cycle graduates than those leaving after the second cycle. In recent years, however, the fastest growth in university studies has been in social sciences (law, economics) and the humanities. For all fields of study combined, it is the number of third-cycle graduates that has increased the most. The increase has been somewhat smaller in the case of State-approved business schools, engineering schools, IUTs and STSs. Outflows from each of those streams increased two-and-a-half-fold between 1984 and 1996.

#### Insert Figure 1

While outflows from most fields of HE have risen sharply, the number of doctoral theses has stood still since 1994. The number of science doctorates has continued to rise, but the number of theses in the humanities has declined: they now account for only 22% of all doctoral dissertations, versus 32% in 1986. This standstill in the number of theses has two main causes: first, the number of DEA (*Diplôme d'études approfondies* - Degree in Advanced Studies) graduates rose very little in the early 1990s, as a greater percentage of masters degree holders switched to the DESS (*Diplôme d'études supérieures*

*spécialisées* - Degree in Specialised Higher Studies); and second, fewer DEA-holders have been going on to write theses.

The number of theses is unlikely to change significantly in the medium term. The number of students beginning a dissertation has already receded as a result of the decline in post-DEA studies. In contrast, the number of people abandoning theses may drop because of the increasing amount of financial assistance available.

## **1.2 Occupational trends are mixed**

Managerial and intellectual professions have been attracting a sharply rising number of graduates since the early 1980s. In particular, the numbers of teachers, engineers and business managers have risen considerably. In recent years, it is the growth in private-sector management jobs that has been most beneficial to people under 30. In that age group, the number of computer engineers tripled and the number of design engineers doubled in 12 years. The outlook seems bright for young private-sector managers. New technologies and the growth of consulting and corporate assistance should underpin steady growth in jobs in engineering and business administration.

The recruiting of teachers at the primary and secondary school levels was massive until the mid-1990s but has been declining slightly in recent years. In HE and public research, recruiting of young graduates was unchanged between 1996 and 1999. Those obtaining doctorates in 1996 have had to face these relatively unfavourable job market conditions. Perhaps their successors will have better luck. Because of the age pyramid for teachers and researchers, a great many people should be retiring in the medium term. Recruiting of young PhDs could then resume if public research budgets stay the same.

## **2. Young PhDs are enjoying some of the benefits of economic recovery**

### **2.1 Labour market entry remains favourable for PhDs**

PhDs have derived some benefits from the economic recovery. They are still more successful at entering the labour market than other university graduates. Their salaries are significantly higher than those of holders of DEA or DESS degrees. In contrast, graduates of engineering schools and leading business schools are finding first jobs more readily than PhDs. Graduates of the *Grandes Écoles* are reaping the full benefit of the upswing in private-sector executive recruitment. On the other hand, PhDs, a majority of whom still seek work in the public sector, are suffering from that sector's recruiting standstill.

More and more often, their first jobs tend to be post-doctoral fellowships or corporate-sponsored research contracts. In 1996, 54% of PhDs in science had fixed-term first jobs, versus 44% in 1994. Thanks to these temporary jobs, most PhDs are able to avoid beginning their careers with unemployment. After the initial fixed-term jobs, the situation for PhDs gets significantly better. After their first three years in the labour market, only 7% of them are unemployed, and their salaries are relatively high (averaging FF 12 300 net per month in 1999, including all bonuses). The salaries of PhDs who have written theses under the CIFRE (*Convention industrielle de formation par la recherche* - Industrial Agreement on Training through Research) were up on 1997, rising to FF 14 000.

**Insert Table 1**

These PhDs are reaping the benefits of the upswing in private-sector recruiting. PhDs of the 1996 cohort were therefore in a slightly more favourable position than those of 1994 after three years of work. In contrast, their initial months in the labour market were more difficult. The outlook did not brighten until

late 1997, after a fairly bleak year in 1996. The unemployment rate is high for PhDs at the beginning of their careers (15 to 19% in early 1997), but drops rapidly thereafter.

## **2.2 *There are sharp disparities in labour market entry, depending on a PhD's field of study***

Among scientist PhDs, the ones with degrees in applied sciences (such as mechanical or electrical engineering, information technology, etc.) and engineering find work most readily. They get jobs quickly, and their unemployment rate three years out of school is insignificant. PhDs in “hard” sciences (such as mathematics or physics) also do well, although their jobless rates are higher at the beginning of their careers.

In contrast, PhDs in chemistry have a rather hard time breaking into the labour market. They have difficulty getting a first job and endure relatively long periods of unemployment early in their careers. In 1999, some 15% of this group were still without work. Of those who were working, 30% had only a fixed-term contract. Their salaries were about average, however (FF 12 000). A majority of PhDs in chemistry work in the private sector, the economic difficulties of which probably explain why they do not do better finding jobs.

The situation is more favourable for PhDs in natural and life sciences. They find work more quickly than PhDs in chemistry, and a majority escape unemployment. But many of them have fixed-term jobs, even after three years of work.

Those with doctorates in law or economics find work quickly and get private-sector managerial jobs more readily than they used to. They earn the highest salaries at the close of HE, on a par with those of CIFRE PhDs (FF 14 000 net per month in March 1999). After three years of work, over 90% of PhDs in law or economics have found work on indefinite-term contracts.

PhDs in the humanities do not experience major difficulties breaking into the labour market, but 14% of them fail to attain managerial or professional status (e.g. as an engineer, private-sector manager, researcher or educator with tenure). After completing theses in the humanities, some PhDs traditionally hold primary or secondary-school teaching jobs. The decline in teacher recruitment at this level probably triggered the growth in intermediate occupations for PhDs in the humanities.

Looking more closely at the career paths of PhDs, it can be seen that two-thirds of them never experience joblessness during the first three years of their careers. Those with doctorates in the humanities and social sciences, along with CIFRE PhDs, are especially well protected from unemployment. PhDs in the “hard” and natural sciences are less well protected. Among them, PhDs in chemistry experience fairly lengthy spells of unemployment, 40% of them having looked for work for more than six months over the course of the period under study. In contrast, the ease of entry into employment for PhDs in applied sciences is being confirmed, since the average length of their job search is particularly short. These PhDs are fairly mobile, two-thirds of them having held two or more jobs in the first three years of their careers.

**Insert Table 2**

**Insert Tables 3,4,5**

## **2.3 *A majority of PhDs still start out in the public sector***

Although recruiting has picked up in the private sector, only 40% of PhDs in the most recently surveyed cohort found jobs there. Even so, the proportion of PhDs entering the private sector has increased by five percentage points in the past two years. PhDs in the humanities and social sciences, who had very

seldom taken up private-sector employment, are beginning to move into that area, although this applies mostly to those whose degrees are in law or economics.

In 1999, PhDs from the 1996 cohort were more likely than their predecessors to take jobs in public-sector research, primary or secondary education and computer engineering. In contrast, fewer of them took employment in higher education. Positions in public-sector research and HE still account for half of the first jobs of PhDs.

While a majority of young PhDs work in the public sector, those who have jobs in the private sector enjoy significantly higher pay (in terms of median net monthly salary, including all bonuses) than the others. The premium for those working for business enterprises was in many cases FF 2 000 per month in 1999—a differential that is relatively constant, irrespective of the field. Private-sector salaries are particularly attractive for those completing theses in law or economics, attaining FF 15 000 net per month. In all fields combined, PhDs working in the public sector earn approximately FF 12 000, and those in the private sector FF 14 000. The high pay of CIFRE PhDs (FF 14 300) stems in particular from the fact that 80% of them work for business enterprises.

Insert Table 6

Insert Figure 2

Insert Figure 3

Insert Table 7

The position one gets after completing a thesis obviously depends on the field of study. Doctorates in mathematics, physics, life sciences and the humanities lead primarily to jobs in the public sector. PhDs in mathematics and physics are split between HE and research. A majority of those with literary degrees become teachers, in some cases outside of HE. A very large proportion (44%) of PhDs in the natural sciences take up jobs in public-sector research.

Theses in the applied sciences (mechanical or electrical engineering, information technology), chemistry, law and economics are oriented more towards the private sector, where half of all PhDs find jobs. Some 40% of all PhDs in mechanical or electrical engineering and information technology become corporate engineers, half of them in IT. In the public sector, many PhDs become teachers. PhDs in chemistry take jobs as corporate research and development engineers or become public-sector researchers. Those with doctorates in law or economics become administrative or business managers or engage in one of the professions in the private sector. They go into HE or managerial jobs in the public sector. A large proportion of CIFRE PhDs become corporate engineers. Fewer than 20% enter the civil service.

Ninety percent of the sectors in which PhDs work involve services. Those whose fields of study are geared most closely to private-sector employment (applied sciences, chemistry, CIFRE) are sometimes recruited by industry. They also work in computer service companies or as engineers. PhDs in chemistry are recruited by chemical firms, pharmaceutical companies and related industries. Even so, education remains the main employer of PhDs, except for CIFRE PhDs.

PhDs in mathematics, physics, natural sciences and the humanities are recruited by the research and education sectors. Those with doctorates in law or economics get jobs in market services (business, legal and accountancy consulting) or education. During the first three years of work, practically no PhDs create their own businesses. Most work as dependent employees. In terms of functions, PhDs' first jobs are similar to the ones they have three years out of school; only the degree of insecurity sets them apart from subsequent jobs.

Insert Table 8

### 3. PhDs seldom remain abroad after their post-doctoral fellowships

Post-doctoral fellowships are becoming much more commonplace among PhDs in science, and their fellowships generally take place abroad. Nearly half of all PhDs in chemistry and life sciences have had such a fellowship after three years of work. In contrast, post-doctoral fellowships are rare for CIFRE PhDs and those who wrote theses in the humanities or social sciences.

#### 3.1 *No mass exodus out of France*

Insert Figure 4

Despite the development of post-doctoral fellowships amongst PhDs in science, only a small percentage of these scientists were living outside France after three years of work. In 1999, 7% of the 1996 cohort of PhDs were abroad (18% of those who had held post-doctoral fellowships and 2% of those who had not). Of the PhDs living abroad in 1999, only 21% did not wish to return to France. Nearly 60% wanted to go back as soon as possible or in a year's time.

The circumstances of French PhDs living abroad explain their desire to return home soon. While a majority of young PhDs working in France had indefinite-term jobs in 1999, 79% of those living abroad were employed on a fixed-term basis—in many cases, on post-doctoral fellowships with satisfactory pay (around FF 12 500 net per month). A majority of expatriate PhDs will certainly return to France when their fellowships are over.

PhDs in fields where jobs are hard to come by are most likely to leave the country. Thus, 8% of PhDs in chemistry and 15% of those in natural and life sciences were living abroad after three years of work. PhDs in life sciences are probably attracted by the boom in biotechnologies in North America, whereas the sector is only beginning to develop in Europe.

#### 3.2 *A post-doctoral fellowship early in one's career makes it easier to obtain a research position*

Insert Figure 5

Post-doctoral fellowships are continuing to develop, but primarily for those who have completed theses in "hard" or natural sciences. In these fields, the proportion of PhDs who have held a post-doctoral fellowship rose from 31 to 42% in two years. Half of the PhDs in chemistry and natural sciences held such a fellowship in the three years following their theses. In most cases, the jobs involved were fixed-term public-sector research appointments outside France.

The impact of post-doctoral fellowships on labour market entry has changed in the past two years. No longer do such fellowships seem detrimental. Fellowships abroad would even appear extremely useful in facilitating entry into the civil service. After completing their theses, those who hold post-doctoral fellowships find work more quickly because of the fellowships. Their unemployment rate is lower three years into their careers. They are more likely to work in the civil service, which explains why their pay is not quite as high. But many PhDs who hold post-doctoral fellowships subsequently move on to fixed-term jobs.

Insert Table 9,10

Post-doctoral fellowships have a positive impact on labour market entry, especially if they come at the very beginning of a person's career. In that case, they significantly shorten the job search and do not seem to be much of a deterrent to recruitment by business enterprises. Post-doctoral fellowships very early in one's career often lead to indefinite-term jobs. Fellowships held later on have a more negative impact on labour market entry. But our survey's three-year time frame does not afford the long-term perspective needed to assess the outlook for PhDs after such fellowships.

Today, a post-doctoral fellowship would seem to be almost a prerequisite for getting into research after writing a thesis in the "hard" or natural sciences. After such fellowships, nearly half of all PhDs become researchers in public-sector laboratories. The others teach in HE. But half of these jobs are for fixed terms at the beginning of the person's career, especially in public-sector research. PhDs in the "hard" and natural sciences who have not held post-doctoral fellowships tend to get corporate engineering jobs or become teachers. The bulk of them had indefinite-term jobs in 1999.

#### **4. The advantages of preparing a thesis while employed by a business enterprise**

##### **4.1 *PhDs who worked for a business enterprise while writing their theses earn higher salaries***

CIFRE theses are the prime example of doctoral dissertations that are prepared for a business enterprise. Most (89%) of the PhDs who benefited from a CIFRE agreement worked for a company while writing their thesis. Half of CIFRE PhDs even prepared the bulk of their theses while so employed. As a result, their career paths differ from those of other PhDs. Nearly 80% of CIFRE PhDs are working for business enterprises three years after completing their theses, whereas the proportion is only half that figure for other PhDs. For any given field, salaries are higher in the business world. The salary differential exceeds FF 2 000 per month, depending on whether PhDs are working in the public or private sector three years after their thesis. CIFRE PhDs are more likely to work in the private sector, and their median remuneration is substantially higher than that of other PhDs (FF 14 200 versus FF 12 000, in March 1999). In addition, the jobs held by CIFRE PhDs are significantly more stable.

**Insert Table 11**

Amongst non-CIFRE PhDs, those who have worked for business enterprises are better off. Like CIFRE PhDs, PhDs who have worked for a company while writing their theses earn higher salaries, and their jobs are more stable. They are more likely to work in the private sector. PhDs in chemistry and in life sciences sometimes encounter difficulties, but if they have written a portion of their thesis while working for a business enterprise they too are better off.

If a business enterprise is the primary location for the preparation of a doctoral thesis, the impact on labour market entry is even greater. Here, net salaries rose to FF 15 000 per month in 1999, and a large majority of the PhDs concerned obtained jobs in the private sector. Overall, it is PhDs who have done the bulk of their theses at university that do least well in finding work. Only a third of them go on to work for business enterprises. PhDs coming from a research institute do a little better, despite the insecurity of their initial jobs. PhDs who have written theses at engineering schools are better off, but their situation is not as good as that of PhDs who write their theses while with a business enterprise.

##### **4.2 *PhDs whose theses are exclusively "academic" have a harder time finding work***

Former recipients of research stipends, whose careers are generally oriented more towards the public sector, can in some cases have trouble finding work. Their first jobs tend frequently to be only temporary, and they run an above-average risk of unemployment. Their median salaries are lower than

those of other PhDs, many of them being employed in the public sector. Former recipients of research stipends have trouble getting jobs irrespective of the field of their thesis. But PhDs who have written theses in chemistry or life sciences have problems even if they have not had stipends, due to a lack of job opportunities in the private sector. A great deal of restructuring has taken place in recent years in the chemical industry.

PhDs who have been graduate assistants are better off. The teacher training that they receive while writing their dissertations makes it easier to break into higher education and get a job more quickly. Half of all former graduate assistants were teaching at universities three years after their theses, versus only a quarter of those who had not been assistants. Such appointments are particularly advantageous in finding work if there is a shortage of job opportunities in the private sector (as there is for chemistry and life science majors).

#### **4.3 *Development of occupational counselling and orientation sessions***

Occupational counselling and orientation sessions were developed in doctoral programmes when labour market entry difficulties started to emerge. They were subsequently organised in a more formal, structured manner as “Doctoriales” seminars. “Doctoriales” were not yet in existence when the 1996 cohort received their degrees, but some of these PhDs had attended occupational counselling and orientation sessions. By this we mean all activities organised by doctoral programme officials to assist PhD candidates with their job search and career planning.

Only 15% of PhDs in the 1996 cohort attended such counselling sessions. This is not surprising, inasmuch as the “Doctoriales” seminars were developed only subsequently. PhDs who attended the initial occupational counselling and orientation sessions are more likely to be working in business enterprises. In most cases, it was more difficult for them to find work than for others. Their periods of unemployment were longer, and it was harder for them to get their first jobs. These PhDs are less likely to hold managerial positions, and their jobs are more likely to be insecure; their unemployment rate in March 1997 was above average.

It is difficult to gauge the impact of occupational counselling and orientation sessions on the labour market entry of the 1996 cohort of PhDs. Those who attended them probably had special characteristics. Perhaps they had less chance of breaking into the public sector in a context in which some instructors found such counselling and orientation sessions hard to accept.

### **5. Amongst PhDs, men and engineers do better breaking into the labour market**

Even at the highest levels, differentials in labour market entry persist between men and women. Amongst PhDs, men find work more quickly, are less affected by unemployment and have jobs that are less insecure. Their salaries are higher than those of women (at FF 13 000, versus FF 12 000, in median net monthly salary in 1999, including all bonuses). These differentials can be seen in all fields of study. They are somewhat lesser for PhDs in mathematics, physics and information technology, where job entry is generally more favourable.

Nevertheless, women occupy essentially the same jobs as men. They are a little less likely to have corporate engineering positions (24% of male PhDs had such jobs in 1999, as opposed to 17% of women).

**Insert Table 12**

Pre-dissertation training, and especially the fact that one holds an engineering degree, has an impact on labour market entry. PhD-engineers do better than the others. They are seldom affected by unemployment or job insecurity, regardless of their field. Their salaries are significantly above average, their profile being especially prized by business enterprises. CIFRE PhD-engineers do remarkably well in their first jobs, earning salaries of around FF 15 000 in 1999. But other PhD-engineers also get favourable initial employment terms. After completing theses in chemistry or life sciences, they scarcely have any problem finding jobs, whereas other PhDs face greater insecurity.

PhD-engineers are more likely than other PhDs to get corporate engineers' jobs (44% of them occupy such positions). They are also more likely to work in a public-sector laboratory, especially if their theses were in chemistry or life sciences. On the other hand, it is fairly rare for PhD-engineers to go into teaching.

**Insert Table 13**