

The impact of training programs content on unemployment duration in France

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Abstract

Job-search oriented and short-term training programs are traditionally compared to long term programs providing occupational skills. We go beyond this traditional distinction relying on French data that allow to have information about training program content. Importantly, we identify programs preparing for a certification and those including experience within a firm, additionally to classroom training. We use the timing-of-events methodology to control both for both observed and unobserved heterogeneity. Our results show that programs preparing for a certification accelerate the transition out from unemployment only when it prepares for a diploma delivered by a Ministry. We also find that programs including experience within a firm increase this transition rate, as well as programs providing occupational skills.

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Keywords: training programs; unemployment duration; unobserved heterogeneity.

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Introduction

The French labor market is characterized by a high unemployment rate : it reached 10.5% by the end of 2015. Among active labor market policies implemented to reduce it, vocational training programs are publicly funded in order to provide occupational skills to job-seekers or to support them in their job search. While the first type of program aims at improving the productivity of the unemployed individuals, the second targets rapid reemployment through short sessions providing soft skills. In this study, we go beyond this traditional distinction, relying on precise information regarding training content. Importantly, we measure the efficiency of programs preparing for a certification and those including experience within a firm.

In Europe, most of studies show that long-term, human capital intensive training programs have a positive effect on employment probability, but the induced lock-in effects make these effects insignificant compared to job-search programs (Weber and Hofer 2004 ; Richardson and Van den Berg 2006 ; Osikominu 2013). Short-term programs seem to be the most efficient ones as they increase the transition rate of participants earlier than longer programs. For example, in Germany, a large literature aims at comparing programs extending professional skills to less specific content programs¹ (Biewen et al. 2007 ; Fitzenberger and Speckesser 2007 ; Lechner et al. 2011). They find that the positive effect of the former type of program is mitigated or canceled by the important associated lock-in effects. Likewise, a comparison of "welfare-to-work" programs in the US² show that positive effects of intensive human capital training appear with a delay but their impact is larger than job search assistance programs. However job search oriented programs are far less expensive than other training programs.

Importantly, this distinction does not fully allow to understand the mechanisms which enhance employability. An important channel of efficiency could be the acquisition of a certification. Indeed, the signaling theory developed by Spence (1973) shows that, in a context of asymmetry of information on the labor market, certification improves information regarding the worker's productivity. Empirically, the literature on "sheepskin effects" asks whether an extra year of education induces a more than proportional increase of wage when it leads to a certificate. When acquired through initial education, previous studies show evidence of important diploma signaling effects (Jaeger and Page 1996 ; Frazis 2002), but more recent ones do not find any impact of holding a diploma on wages (Clark and Martorell 2014). Additionally, there is no consensus on the acquisition of the General Education Diploma³ (GED) impact on employment or earnings outcomes (Tyler et al. 2000 ; Tyler et al. 2003; Heckman and LaFontaine 2006 ; Heckman et al. 2014 ; Jepsen et al. 2016). The effect of certifications acquired through continuous training has been much less studied. However, the effect of acquiring a National Vocational Qualification of level 2 (NVQ2)⁴ through vocational training has been measured in the UK. Empirical evidence shows that some sub-groups of population seem to significantly benefit from such training, such as women (Coulon et al. 2008; Blanden et al. 2012) or low-educated individuals who upgrade their initial skills (Dearden et al. 2004 ; McIntosh and Garrett 2009 ; Dorsett et al. 2010). Labor market outcomes

¹The first type of program is usually called a "further training" program, while the second type is a "retraining program".

²Those programs were implemented since the late 1960s and aimed at getting welfare recipients back to employment. The "Human Capital Development" programs aimed at improving either basic or job-related skills of recipients while the "Labor Force Attachment" programs goal was to find a job rapidly. For example, unemployed individuals may learn in job clubs how to prepare an interview or to build resumes.

³Implemented in 1942 in the US, the aim was to provide a "second chance" to individuals who dropped from high school without any diploma.

⁴National Vocational Qualifications are work based qualifications in the UK.

might depend on the signal quality : [Jepsen et al. \(2014\)](#) show that associate's degrees and diplomas induce a substantial increase of income compared to certificates, especially for women.⁵

Another determinant of programs efficiency is the inclusion of on-the-job training, i.e working within a firm additionally to classroom training. In France, on-the-job training has mostly been evaluated as apprenticeship or "contrat d'alternance" for young workers. [Bonnal et al. \(1997\)](#) show that programs including both experience within a firm and the acquisition of a qualification, such as apprenticeship programs, lead to stable employment compared to other training programs. In Germany, empirical evidence shows that on-the-job training might benefit to women ([Biewen et al. 2007](#)), but overall does not improve employability nor incomes on average ([Fitzenberger et al. 2006](#) ; [Fitzenberger and Völter 2007](#) ; [Lechner et al. 2011](#)). Experience within a firm might allow job seekers to gain soft skills or firm specific skills which are more difficult to acquire in formal classroom training. Additionally, such experience expands the job seeker's network, which is an advantage on the labor market.

In this article we ask whether individuals who followed a certifying program exit more rapidly from unemployment. Contrary to the existing literature which compares low and high intensive human capital contents, we make the distinction between different channels which might impact the efficiency of training programs targeting unemployed individuals. For this purpose, we rely on an original dataset from the French Public Employment Service (PES) which precisely describes the content of training programs. We first evaluate the impact of having followed a training program preparing for a certification on the probability of exiting from the unemployment register. Importantly, we adopt a broad definition of what is a certification : it can be a diploma which is recognized by the State, by branches in their own classification, or by employers when looking for a specific skill such as a software certification or a language one. We further restrict this definition to high quality certifications, i.e those delivered by a Ministry. Then, we study the effect of programs including experience within a firm, which we call "on-the-job" training programs and compare job search oriented programs to those targeting a specific field (agriculture, manufacturing or tertiary field).⁶

Measuring a causal effect of training participation first requires to account for training assignment endogeneity. Indeed, participation is not random as caseworkers from the PES might assign to training the least employable individuals. On the other hand, the most motivated job seekers are more likely to apply for training participation. Second, exiting from unemployment and participating to a training program are competing risks, as such participation is not observable once the job seeker finds a job. Importantly, the latter risks are also correlated, as unobserved individual characteristics might affect both training participation and employability. We identify the effect of training participation relying the timing-of-events methodology developed by [Abbring and Van den Berg \(2003\)](#), which allows to identify a causal effect accounting for the timing at which treatment occurs.

Consistently with previous studies, we find that training programs delivering occupational skills do better at increasing the transition rate out from unemployment than job-search oriented programs. When looking at the potential determinants of efficiency, we find evidence that training programs preparing for a certification delivered by a Ministry and programs including experience within a firm are efficient channels raising individuals

⁵Certificates acquisition does not require more than one year of course work ; they are obtained through specific programs where students demonstrate a specific set of skills to potential employers.

⁶The latter distinction partly covers the initial one between job search and human capital intensive programs.

transition rate out from unemployment. We also show that training benefits are higher for female participants, which might be due to occupational differences. Evidence of the higher efficiency of some training programs has important implications in terms of public fundings. In France, individuals benefit from public funding for training participation via a specific account⁷ mainly when the program prepares for a certification. A set of more refined criteria could be implemented for funding eligibility, as the certification quality also matters, and is not the only determinant of programs efficiency.

The paper is organized as follows. First, we briefly describe the French training system (section 1), and describe our data (section 2). In a third part we develop our empirical strategy (section 3). Results are presented in section 4 and we present preliminary results regarding the training content effect on the unemployment recurrence in section 5. We conclude in section 6.

1 The French training system

The French training system for the unemployed is run by the Public Employment Service (PES), the administrative regions and the social partners. Job seekers receive a constant unemployment benefit during 2 years from the PES. If they participate to a training program and are still eligible to unemployment benefits, they are entitled to a specific remuneration⁸ from the French PES. Nevertheless both compensations are not cumulative, a trainee cannot get paid as such two years after he entered unemployment.⁹ When rights to unemployment benefits get exhausted before the end of the training program, individuals can benefit from a PES funding.¹⁰ The State also provides a revenue to unemployed individuals who are not eligible to unemployment benefits, called "Régime de Stagiaire Public" (RSP). Second, training costs represent a different budget category. They are mainly funded by the PES (23% in 2013, see [Cavan 2015](#)) and administrative regions (54%). While the former mainly aims at helping job seeker to rapidly go back to work, administrative regions traditionally fund human capital intensive training programs. All in all, training funding of job seekers and trainees remuneration represented 451 million euros in 2012 ([Delort and Mesnard 2015](#)).

Every job seeker elaborates a specific project together with a caseworker. This roadmap, called "Projet personnalisé d'accès l'emploi" (PPAE), defines the occupation, the sector and the reservation wage asked by each individual when he is looking for a job.

In some cases, individuals prepare an examination to obtain a certification during the program. It can be a diploma which is recognized by the State,¹¹ by branches in their own classification, or only valued by employers when looking for a specific skill such as a software certification or a language one. Though an attendance certificate is delivered at the end of each training program, it differs from diplomas which acknowledge skills acquisition. In our data, 60% of training programs prepare to a certification (see table 1). Most of courses prepare to a certification which is not delivered by a Ministry ; among them, our data do not allow

⁷A personal account ("Compte Personnel de Formation") was implemented in 2015, aiming at promoting training participation among unemployed and employed individuals.

⁸This remuneration is called "Allocation d'Aide au Retour à l'Emploi" (AREF).

⁹Thus, a trainee does not have any financial incentive to participate to a training course in order to benefit for unemployment insurance for a longer period.

¹⁰This specific funding is called "Rémunération des formations de Pôle emploi" (RFPE)

¹¹A national register ("Répertoire National des Certifications Professionnelles") includes all the certifications recognized by the State.

to make the distinction between those which are recognized by the State from those which are not. They can span a large panel of certifications, such as a driving license or an English certificate. On the other hand, certifications delivered by a Ministry mainly come from the National Education Ministry (7% of all training programs). Finally, 2 % of certifications are elaborated through collective bargaining : "Certificats de Qualification Professionnelle" (CQP) are built by social partners in order to fill a particular demand in a sector.¹² Some training programs also contain on-the-job training, which allows the trainee to gain field experience in addition to formal classroom training.¹³

Regarding training providers, 79% of training programs followed by unemployed individuals were delivered by a private organization in 2011 (Delort 2013). Most of them were non-profit organizations. Additionally, an important share of public structures are run by the National Ministry of Education¹⁴ and by an agency affiliated to the National Ministry of Labor.¹⁵ In our data, they represent 12% and 16% of training programs delivered, respectively.

2 Data

2.1 Data sources and restrictions

Unemployment data. Our empirical analysis relies on a 1% sample of the "Fichier Historique" (FH) from the Public Employment Service, which contains information on workers entering and leaving unemployment between January 2009 and September 2014.¹⁶ We observe individual characteristics such as gender, age, initial level of education¹⁷ and unemployment recurrence since 2000. Entry and exit dates from unemployment registers are provided,¹⁸ as well as observed dates of training participation. We aggregate the unemployment spells which are separated by less than 30 days, which ensures that the exit from unemployment registers is stable and does not correspond to a very short employment contract. We consider the first four unemployment spells experienced by the job seeker since 2009, which leads to include a large majority of the sample¹⁹ (see table 2).

We further restrict the sample in order to work on a homogeneous sample. We exclude from the sample individuals who are trained as part of an agreement between the PES and a firm ("Action de Formation Préalable au Recrutement", AFPR) as it is agreed before the program that the individual will be then recruited upon completion. Individuals below 15 and over 55 years old are also dropped from the sample in order to keep a relatively homogenous population. Finally, we drop individuals who benefited from "Contrat de Sécurisation Professionnelle" (CSP) or similar programs,²⁰ which represent 2,2% of the initial sample. These programs aim

¹²Some of CQP are recognized by the State.

¹³Typically, a job seeker is allowed to follow a pre-professional contract ("Contrat de Professionalisation") in order to foster professional insertion while preparing a vocational certification.

¹⁴"Groupements d'établissement" (GRETA) are local public teaching organizations which gather resources to provide vocational training for adults.

¹⁵The "Association nationale pour la formation professionnelle des adultes" (AFPA) became in 2017 "Agence nationale pour la formation professionnelle des adultes".

¹⁶We exclude from the sample individuals living in overseas departments.

¹⁷We drop from the sample observations for which the variable "education" is missing. It represents 1% of our sample.

¹⁸The reason why the individual leaves the Public Employment Service register is badly completed in our data, which does not allow to link an exit from the administrative register to a transition toward employment. The outcome we measure is rigorously an exit from the Public Employment Service register. However, restricting the sample to individuals below 55 years old reduces the share of individuals retiring after register exit.

¹⁹We drop less than 10% of observations from the initial sample.

²⁰The "Contrat de Sécurisation Professionnelle" replaced the "Convention de Reclassement Personnalisé" and "Contrat de Tran-

at supporting individuals who were laid off for economic reasons, in firms of less than 1000 workers. During 12 months, unemployed individuals get a specific allowance²¹ and benefit from a specific assistance for reentering employment. As compensation differs, those individuals are not comparable to other job seekers.²² Additionally, as a proxy for the labor demand we control for the unemployment rate measured in the job seeker’s department at the beginning of his unemployment spell.

Construction of the income variable. Unemployment data also provide information about the reservation wage asked by the job seeker when he enters the PES register. We use this variable in our analysis for a descriptive purpose, mainly because we cannot gather this information for all individuals. [Le Barbanchon et al. \(2016\)](#) argue that the PES monitoring role does not lead job seekers declaring a wrong reservation wage when they register as unemployed,²³ so it should measure the minimum wage for which the individual will accept a job. Following [Le Barbanchon et al. \(2016\)](#), we work further on this variable in order to reduce the measurement error. First, we only consider job seekers looking for a full-time job as it is not explicit whether the wage question concerns a full-time or part-time job. Second, we exclude observations with extreme reservation wages, i.e. when they are below the minimum wage or greater than 3200 euros.²⁴ We thus drop 28% of observations, which represent 15% of single individuals. The median monthly reservation wage is 1440 euros.

Training data. Our data also provide detailed information about training content.²⁵ It concerns individuals who follow a training program and are eligible to unemployment benefit (AREF) or alternative revenues.²⁶ Our analysis thus does not concern individuals who benefit from a State remuneration ; in 2014, they represented less than 1% of the total amount of job seekers who were benefiting from any allowance while following a training program.²⁷ We have information on theoretical training dates, the program domain and level, the training provider and whether or not it includes experience within a firm.²⁸ We also identify whether or not individuals prepare a diploma during the program. Though we do not know whether individuals obtain the diploma they were preparing during the training program, we assume that most of individuals obtain the certification at

sition Professionnelle” in 2011.

²¹This allowance called "allocation de sécurisation" represents 80% of the reference rate.

²²The training program duration is also badly measured, as it is automatically set to one month as soon as it is in a CSP context. This setting prevents from relying on duration data for those individuals.

²³The authors highlight that job seekers’ search effort is controlled by comparing the posted wages of vacancies to which job seekers apply, to their past wage but not to their reservation wage.

²⁴If declared in hours or annual terms, we also transform the wage in monthly terms, relying on the legal number of working hours for full-time workers.

²⁵The "Segment P2" is a specific part of the Public Employment Service "FHS". Data precision regarding the programs content comes from the fact that its characteristics are filled by the training provider in a specific form. The "Attestation d’Inscription en Stage" provides information regarding the timing of the course as well as its content. A second form ("Attestation d’Entrée en Stage") is sent to the PES when the individual begins the program, which triggers the payment of the trainee’s remuneration.

²⁶Alternative revenues correspond to "Rémunération Formation Pôle Emploi" (RFPE) or "Allocation de sécurisation professionnelle" (ASP). The former is an allocation for job seekers following a training program but whose unemployment insurance gets exhausted before the end of the program. The latter is the allowance for "Contrats de Sécurisation Professionnelle" (CSP) recipients.

²⁷This share is computed according to a note from the PES ([PES 2015](#)).

²⁸In detail, we do not rely on theoretical training dates to measure training duration, but it provides a good idea of the completion rate. We know the training provider SIRET but we cannot match it to any database to make the distinction between several types of training centers. Our data do not provide any information regarding the duration of the experience within a firm, nor regarding the firm involved in the program.

the end of the program. Public statistics show that the completion rate among adults preparing a diploma delivered by a Ministry is quite high : it reaches 80% for certifications delivered by the National Ministry of Employment²⁹ and stands between 89% and 79% for level V diploma delivered by the National Ministries of Education and Agriculture.³⁰

Because individuals might successively participate in multiple different programs of a same training track, we aggregate the programs at the track level.³¹ Then, we only consider the impact of the *first* training program followed and do not account for additional training programs, which can artificially extend the measured unemployment duration. However, table 3 shows that individuals following multiple training programs in the same unemployment spell represent a small share of the sample : 6% of trainees participate in two programs and less than 1% in more than two.

We compare theoretical training dates to observed training dates in order to identify dropout.³² In our sample, 8% of trainees left the program earlier than the theoretical exit date. More precisely, 5% dropped from the program and returned to unemployment, while 3% found a job during the program.³³ During training, individuals are more likely to drop from the program toward employment when it is a certifying one or when it includes on-the-job training (for more details, see appendix F). In cases where treatment is not followed until the end, we might measure a lower bound effect.

2.2 Certifications characteristics and training content

Our data show that programs in the tertiary and business support fields each concentrate one third of the total amount of training programs followed. While the former includes the longest and most certifying training programs, the latter regroups short courses including less on-the-job training than average.

Training programs are divided into 4 fields : general, manufacturing/agriculture, business support and the tertiary domain. General training mainly concerns career guidance and assistance with the job search. Programs delivered in the manufacturing field provide, for example, skills for sanitation facility or welding, while in the agriculture field many programs concern landscaping skills. Business support training programs cover a large set of possibilities : they mainly prepare to the acquisition of driving licenses for specific means of transportation, provide office automation software skills or assistance in firm creation. Finally, training programs in the tertiary field mainly concern social and health care. We first make the distinction between job-search oriented and field specific training programs.³⁴ The first type of program includes training programs delivered in the general and business support domains. As shown in table 4, this type of program lasts around 3.5 months while the average program duration is 5 months. They also include less on-the-job training. Training programs delivered in the general domain aim at defining a project with the unemployed individual and to train her in job

²⁹The latter are called "Titres professionnels du Ministère de l'Emploi" (see [DGEFP 2015](#)).

³⁰The latter correspond to "Brevet d'Etudes Professionnelles" (BEP) and "Certificat d'Aptitude Professionnelle (CAP)". See [Robin \(2016\)](#).

³¹We consider that two training programs are part of the same track when they are separated by less than 65 days, which corresponds to the average duration of a break during summer holidays. Training programs also need to have the first three digits of their training program ("formacode") in common.

³²We consider that an individual dropped from the training program if the observed ending date of the program differs by more than 15 days from the theoretical ending date, in order to account for measurement error.

³³The fact that few individuals leave training before the end of the program reflects the importance of the lock-in effect which automatically extended the job seeker unemployment duration.

³⁴We alternatively define this type of training as human capital intensive programs, in line with the rest of the literature.

seeking techniques. They only represent 16% of training programs, however the most followed non-certifying programs fall within this category (table 5). Half of training programs delivered in the general field prepare for a certification, which is much less important than in other sectors.³⁵ It is worthwhile to notice that general training programs are very concentrated, as the three most assigned programs in this domain cover almost half of the total amount of programs followed (table 6). Second, one third of training programs are related to business support, which are the shortest programs. They mainly concern the acquisition of skills in office automation softwares, specific driving licenses and train individuals to create their own firm.³⁶

On the other hand, human capital intensive training programs cover programs delivered in the manufacturing, agricultural and tertiary fields. They last between 5 and 8 months on average, include more certification and on-the-job training, with almost 75% of the tertiary field programs preparing for a certification. More than half of training programs prepare to a level IV acquisition,³⁷ whether certifying or not. Moreover, the three most popular certifying programs concern the tertiary domain, mainly for personal assistance services.³⁸

Overall, table 7 shows that training programs lead to a certification in 60% of cases. They are the longest ones, especially when preparing for a certification elaborated by a Ministry,³⁹ which last slightly less than 8 months. Those programs represent 13% of all training programs. Non-certifying programs include more experience within a firm than other programs.

2.3 Individuals' characteristics and unemployment durations

Some individuals' observed characteristics are strongly associated to specific training programs types. Table 8 shows the results of an OLS regression on the probability to enter into (i) any type of training program, (ii) a certifying program, (iii) a training program preparing to a Ministry certification, and (iv) a program including experience within a firm. Note that the first regression compares trainees' to non-trainees' characteristics, while the following estimations only include trainees. Table 9 shows determinants of the enrollment in training programs by type of training. Though they access less frequently to training, the most educated individuals are, among trainees, the most likely to access to courses preparing for a certification, especially when the latter is delivered by a Ministry. On the contrary, individuals initially holding a level IV diploma are the most numerous to prepare another type of certification. Interestingly, access to on-the-job training is negatively correlated with the educational level : the least educated job seekers benefit 9 percentage points more often than the most educated ones to this type of program. Regarding the effect of age, the oldest individuals get mostly assigned to general and business support courses, as they are 12 percentage points less likely than the youngest to get access to a training program in the tertiary sector. They do not benefit from on-the-job training programs.

The unemployment spell duration is first driven by the individual's observed and unobserved characteristics.

³⁵Many certifications are being prepared in order to confirm the acquisition of the common core of knowledge and skills. For example the acquisition of the "Certificat de formation générale" (CFG) ensures the acquisition of basic knowledge in French, mathematics and "professional and social life". It can be acquired by adults who followed a training program or a social inclusion program.

³⁶Firm creation programs deliver a certification such as "Passeport pour Entreprendre", which is recognized by the French national commission of certification (CNCP).

³⁷This type of program aims at reaching a level of the French CAP, BEP or BAC.

³⁸Whether certifying or not, the most followed tertiary programs are nurse, assistant nurse and homecare assistant.

³⁹The main ministries delivering a certification are the National Education, Employment, Agriculture, Youth and Sport Ministries

A non-parametric estimation of the exit from unemployment hazard shows that individuals who participate to a training session experience longer unemployment durations than individuals who were not trained (see figure 1). It is due to a "lock-in-effect" which mechanically raises the duration during which they are unemployed. However individuals enrolled in certifying programs still experience slightly longer unemployment durations without accounting for lock-in effects.⁴⁰ It could first be due to a negative selection effect : if the PES assigns the least employable individuals to training programs, it could explain that participants have a higher probability to stay unemployed in the absence of any training participation. This pattern can also be explained by higher trainees reservation wage or an increase of the trainees' reservation wage once they look for a job after having benefited from a training program.⁴¹ Figure 2 shows that both mechanisms might be at stake. Here we identify job seekers ranging in the highest and lowest quartiles of the reservation wage distribution,⁴² and compare their survival rates without accounting for training durations. For a given level of reservation wage, individuals always stay unemployed for a longer duration when they follow a certifying program compared to trainees in a non-certifying program, however this difference is much smaller for low-wages individuals. Negative selection and high wages both seem to extend the unemployment duration. When accounting for different types of certification, this negative selection bias disappears for Ministry certifying programs (see figure 3). Thus, individuals enrolled in other certifying training programs seem less employable than other trainees. On the contrary, on-the-job training programs participants seem to be positively selected (see figure 4). Finally, figure 5 shows that individuals enrolling in human capital intensive training programs experience long unemployment spells because of their training duration, but present better observed and unobserved characteristics than individuals enrolling in job search oriented programs.

Tables 10 and 11 also show that individuals beginning to get trained relatively late in their unemployment spell mechanically experience longer unemployment spells. It might also reflect less involvement or motivation in this project than individuals who begin the program at the beginning of their spell.

Finally, we are specifically interested in the effect of training programs contents, which might differently impact the ability of individuals to find a job later. For example, job seekers who get assigned to a training program in the agriculture, manufacturing or tertiary domain experience a shorter unemployment spell after the end of the course compared to other trainees, whether preparing a certification or not. Our estimation strategy should allow us to check whether this impact is causal or not.

3 Empirical strategy

We develop a competing risks duration model where an individual has the possibility either to be assigned to a type A training program, a type B training program, or to find a job. The latter are competing risks in the sense that once an individual finds a job, we cannot observe training participation anymore. Those risks are also correlated, as some unobserved characteristics might jointly influence the individual's trajectory. We set T , T_{p1} and T_{p2} the duration until exit from unemployment, entry into the first and second type of training, respectively. In our main specification, T_{p1} (T_{p2}) is thus the duration of unemployment until entry into a certifying training program (non-certifying program). A causal effect of training participation corresponds to the effect of the

⁴⁰We artificially set to zero the training duration in the second part of the graph.

⁴¹Le Barbanchon et al. (2016) show that higher reservation wages predict a longer unemployment period.

⁴²As mentioned in section 2, the reservation wage is measured at the beginning of unemployment spell, which prevents from observing any variation in this variable.

realization of T_{p1} or T_{p2} on T . In our main example, if we observe several unemployment-employment transitions after the transitions unemployment - certifying training program, conditional on observed and unobserved characteristics, we can draw some conclusions about the impact of certifying training. This is the so-called "timing-of-events" method developed by [Abbring and Van den Berg \(2003\)](#).

We rely on two major assumptions : first, the *no-anticipation assumption* requires that individuals do not behave differently once they know their assignment training date. In our case, it is unlikely that individuals anticipate the exact timing at which they enter training, as the French PES does not fix any statutory date beyond which training becomes mandatory. Second, according to the *conditional independence assumption*, controlling both by observed and unobserved characteristics allows to drop out any selection bias.

We model duration in continuous time, as unemployment spell information is provided on a daily basis in the PES registers. As shown in figure 6, we consider that when an individual is unemployed she can either find a job, or start a training program. The latter can prepare or not to a certification. Most of trainees complete the program they began, go back to unemployment once they leave the program, and then find a job. We observe relatively few individuals finding a job right after their training program.⁴³ We rely on observed program exits in order to measure the exact unemployment duration after training.⁴⁴ We use multiple spells data, considering the first four unemployment spells experienced by the job seekers. Relying on multiple spells data allows to estimate the effect of time-varying covariates.

Benchmark model. We denote h_{UE} , h_{UTC} and h_{UTNC} the transition rate from unemployment to employment, certifying and non-certifying training programs respectively. These transition rates are assumed to follow a Weibull law, characterized by parameters α_{UE} , α_{UTC} and α_{UTNC} respectively. We have in mind that a piecewise constant hazard is a more flexible specification, however figure 7 shows that the hazard function of exit from unemployment relatively fits a Weibull law. Additionally to this baseline hazard, we assume that individuals' hazard rates shift proportionally to their own characteristics, whether observed or not (proportional hazard hypothesis). We set $x(t)$ as a vector of observable covariates which vary over time.⁴⁵ They include individual characteristics (initial level of education, age, gender and whether she already experienced an unemployment episode) and contextual variables (year at which she entered into unemployment and the unemployment rate at that time in the department).

We set ν_{UE} , ν_{UTC} and ν_{UTNC} as unobserved individual characteristics which influence the probability of transit from unemployment to exit out from unemployment, certifying and non-certifying training programs respectively. We denote t , t_{p1} and t_{p2} the realizations of T , T_{p1} and T_{p2} , respectively. We also denote t_{e1} (t_{e2}) the duration from entry into unemployment until certifying (non-certifying) program exit. The difference $t_{e1} - t_{p1}$ ($t_{e2} - t_{p2}$) corresponds to the certifying (non-certifying) program duration. Transition rates from unemployment to exit from unemployment are specified as follows :

⁴³Individuals dropping from training for a job or who immediately find a job after training represent 11% of individuals who follow a training program.

⁴⁴When the individual immediately leaves unemployment after training exit, we artificially add one day during which the individual is still unemployed in order to keep the model tractable.

⁴⁵In the benchmark model accounting for unobserved heterogeneity, x does not include a constant as the constant terms in hazard rates are represented by the means of heterogeneity terms.

$$h_{UE} = \alpha_{UE} * t^{\alpha_{UE}-1} * \exp[x(t)'\beta_0 + \beta_{01} \cdot \mathbf{1}(TC = 1)(t > t_2) + \beta_{02} \cdot \mathbf{1}(TNC = 1)(t > t_2) + \nu_{UE}] \quad (1)$$

$$h_{UTC} = \alpha_{UTC} * t_{p1}^{\alpha_{UTC}-1} * \exp[x(t)'\beta_1 + \nu_{UTC}] \quad (2)$$

$$h_{UTNC} = \alpha_{UTNC} * t_{p2}^{\alpha_{UTNC}-1} * \exp[x(t)'\beta_2 + \nu_{UTNC}] \quad (3)$$

where $(TC = 1)$ if the job seeker followed a certifying training program, and $(TNC = 1)$ if he followed a non-certifying program. We are interested in the β_{01} and β_{02} parameters, which correspond to the impact of getting enrolled into a certifying and non-certifying program. We first want to test the hypothesis that following a training program has a positive effect on the hazard rate out from unemployment, i.e $\beta_{01} > 0$ and $\beta_{02} > 0$. We then check the hypothesis that a training program preparing to a certification boosts the exit out from unemployment compared to another type of training, i.e $\beta_{01} > \beta_{02}$.

We measure the *ex-post* effect of both types of training program, which induces that between t_{p1} and t_{e1} (t_{p2} and t_{e2}), the "clock" stops running. It allows to remove the lock-in effect due to training. If ones wants to compare a trainee to a non-trainee since time t_{p1} (t_{p2}), with the former beginning a training program and the latter keeping on looking for a job, a different specification should be adopted.

Three types of training programs. We identify more precisely the type of certification prepared during the program. h_{UTCM} , h_{UTC0} and h_{UTNC} are transition rates from unemployment to exit from the PES registers after a training program preparing to certification delivered by a Ministry, by another institution or not certifying, respectively. Setting $(TCM = 1)$, $(TCO = 1)$ and $(TNC = 1)$ when the individual followed, respectively, a training preparing to Ministry certification, another type of certification or non-certifying training program, the hazard functions for unemployment exit and training participation become :

$$h_{UE} = \alpha_{UE} * t^{\alpha_{UE}-1} * \exp[x'\beta_0 + \beta_{001} \cdot \mathbf{1}(TCM = 1) \quad (4)$$

$$+ \beta_{002} \cdot \mathbf{1}(TCO = 1) + \beta_{003} \cdot \mathbf{1}(TNC = 1) + \nu_{UE}] \quad (5)$$

$$h_{UTCM} = \alpha_{UTCM} * t_{p1}^{\alpha_{UTCM}-1} * \exp[x(t)'\beta_1 + \nu_{UTCM}] \quad (6)$$

$$h_{UTC0} = \alpha_{UTC0} * t_{p2}^{\alpha_{UTC0}-1} * \exp[x(t)'\beta_2 + \nu_{UTC0}] \quad (7)$$

$$h_{UTNC} = \alpha_{UTNC} * t_{p3}^{\alpha_{UTNC}-1} * \exp[x(t)'\beta_3 + \nu_{UTNC}] \quad (8)$$

The parameters β_{001} , β_{002} and β_{003} identify the impact of programs during which, respectively, individuals prepare a certification delivered by a Ministry, by another institution, or do not prepare any certification.⁴⁶

Unobserved heterogeneity specification. Individuals present unobserved characteristics associated to each correlated risk : transition to employment (V_{UE}), certifying training (V_{UTC}) and non-certifying training program (V_{UTNC}).⁴⁷ We consider the joint distribution of the unobserved heterogeneity as bivariate, with two unrestricted mass point locations for each term. Let ν_{UE}^1 , ν_{UE}^2 , ν_{UTC}^3 , ν_{UTC}^4 , ν_{UTNC}^5 and ν_{UTNC}^6 be

⁴⁶Note that due to the important number of parameters to estimate we rely on single spell data for this estimation.

⁴⁷Notations adopted here follow the presentation made by Richardson and Van den Berg (2006).

the points of support of V_{UE} , V_{UTC} and V_{UTNC} respectively. The associated probabilities are denoted as $p_{jkl} = Pr(V_{UE} = \nu_{UE}^j, V_{UTC} = \nu_{UTC}^k, V_{UTNC} = \nu_{UTNC}^l)$ with $j = 1, 2$, $k = 3, 4$ and $l = 5, 6$.

We parameterize those probabilities as a multinomial logit in order that they each range between 0 and 1, and that they sum to one. It gives the following specification of the normalized probability π_{jkl} :

$$\pi_{jkl} = \frac{\exp(p_{jkl})}{\sum_{j=1}^2 \sum_{k=3}^4 \sum_{l=5}^6 \exp(p_{jkl})}$$

We normalize $p_{246} = 0$ such that the π_{jkl} probabilities sum to one.

The final log likelihood is available in the appendix C. We estimate this model by maximum likelihood.

When estimating the effect of three types of treatment, we make an additional assumption when specifying the unobserved heterogeneity to allow the model estimation. We exclude the case where an individual has a positive probability to participate to two or three types of training programs. Whatever his employability, an individual can only participate to one type of training, which is relevant as we only model the first participation to a training program. See appendix D for more details.

4 Results

We first estimate the impact of participation to any type of training program (see table 12). Without accounting for unobserved heterogeneity, following any training program raises the transition rate from unemployment to employment by 31% ($\exp(0.271)-1$), while this impact reaches 38% accounting for unobserved characteristics. It confirms the negative bias previously observed in training assignment : less employable job seekers are more often sent to a training program. A naive estimation thus provides a downward biased estimation.

Our estimated results are slightly more important than those presented by Crépon et al. (2007) regarding the effect of training participation, which could be due to several reasons. First, we only focus on individuals eligible to unemployment benefits, while the authors look both at eligible individuals and welfare recipients. Second, we exclude job seekers who benefit from "Contrat de Sécurisation Professionnelle", as they benefit from a better compensation. Thus, they might not be representative of other job seekers.⁴⁸

4.1 Certifying training programs

One type of certification. As a comparison, we first remove unobserved heterogeneity terms. Table 12 shows that beginning a non-certifying training program raises individuals' transition rate from unemployment to employment by $\exp(0.315)-1 = 37\%$ while those preparing to a certification raise it by 27%. However, both coefficients do not significantly differ.

Accounting for unobserved characteristics raises the estimated effect of both types of training programs, particularly the one of certifying training programs : participating to such a program raises the hazard rate out from unemployment by 33% while assignment to a non-certifying program raises this hazard rate by 39%.

⁴⁸Moreover, the training duration of job seekers benefiting from this agreement is systematically set to one year in the data, which might overestimate the lock-in effect associated to training participation in the mentioned study.

Though both coefficients still do not significantly differ, it is worth noticing that the negative bias previously mentioned is more important for certifying training programs. Regarding the unobserved heterogeneity distribution, we find that $\nu_{UE}^1 > \nu_{UE}^2$, $\nu_{UTC}^3 < \nu_{UTC}^4$ and $\nu_{UTNC}^5 > \nu_{UTNC}^6$. The estimated unobserved heterogeneity distribution (see table 13) shows that the population is split into three groups, first with low employable individuals joined with a low probability to attend a training program. The second group regroups more employable individuals who do not get trained and the last one covers employable job seekers who participate to a non-certifying training program. A negative selection bias into certifying training programs is confirmed by the important gap between estimations with and without unobserved heterogeneity for this treatment effect.

The transition rate from unemployment to exit from the PES registers decreases with age, which might be due to the fact that the youngest unemployed individuals are the most likely to accept short term labor contracts (see table 14). Individuals who do not hold any diploma might also be in that case. Finally, individuals who already experienced an unemployment spell are less likely to find a job than others. Looking at the impact of covariates on the transition rate from unemployment to both types of training programs, we find that the least educated individuals access training less often, which is also the case for individuals who already experienced an unemployment spell.

Table 15 shows that training programs preparing to a certification are more efficient than non-certifying programs specifically when considering *women* : it raises their transition rate out from unemployment by 36% as opposed to 17% for men, who still benefit more from non-certifying programs. This is in line with previous studies,⁴⁹ which explain this difference in benefits by differing training impacts across occupations. For example, women work more frequently in the health and social sectors, in which certifications are required more often than in other domains. The measured gap might thus reflect a composition effect across fields rather than a gender difference.

Two types of certification. We then identify different types of certifications acquired during a program : some diploma are delivered by a Ministry while some are not. It may be that the former deliver a better signal quality than other certifications. Table 16 results confirm that training programs preparing for a certification delivered by a Ministry do better at increasing individuals' exit rate from unemployment compared to other certifying training programs. Though the identification strategy is less precise than in the previous case, we find evidence that training programs preparing to a highly recognized certification raises the transition rate out from unemployment by 53%. On the other hand, certifications other than those delivered by a Ministry might cover a very broad range of signals (driving licenses, basic literacy or IT skills certifications, etc.). Ministry certifying programs are mostly followed by individuals who are already employable. Indeed, highly educated job seekers and individuals below 30 years old are the most likely to follow such a training program.

Robustness check. In a last estimation, we check that our estimations are not driven by a specific part of the unemployed individuals population. Our sample includes individuals registered in a specific category as they benefit from a subsidized contract.⁵⁰ A sizable part of these individuals follow a training program alongside their work. Including this population in our benchmark sample might bias our results downward,

⁴⁹See Lechner et al. (2011) ; Osikominu (2013).

⁵⁰They are classified in the 5th category, "demandeurs d'emploi non tenus de faire de actes positifs de recherche d'emploi, en emploi".

as those individuals are not asked by the PES to immediately look for a job. Table 17 shows the results of our main empirical model, excluding individuals registered in this specific category. We find that the effect of training participation increases compared to previous estimations, as participating to a program preparing to a certification raises the exit hazard rate by 38%. This effect is still not significantly different from the one of non-certifying training programs.

4.2 Other types of training

On-the-job training. In a second step, we compare trainees in programs including on-the-job training to those enrolled in other training programs. Without accounting for unobserved characteristics, on-the-job training raises the transition rate out from unemployment by 41%. Accounting for unobserved heterogeneity does not modify those results, as on-the-job training increases the transition rate out from unemployment by 42% while programs without on-the-job training increase this rate by 15% only. Neither of those coefficients are significant but the gap between both treatment effects is larger than in the previous case. Regarding the distribution of unobserved heterogeneity, one third of the population is less employable and does not access to any type of program, another third presents positive unobserved characteristics regarding employability and access to on-the-job training programs as well. Such a positive correlation between employability and experience within a firm confirms descriptive evidence that there is a positive selection process driving participation to this type of program.

Younger individuals are more likely to benefit from on-the-job training (see table 14), as well as individuals initially holding their baccalaureate or a vocational degree. On the contrary, the older job seekers are significantly less likely to follow on-the-job training programs. Women do more often participate to such programs.

Finally, we show in table 15 that the effect of on-the-job training programs is slightly higher for women, as it increases their transition rate out from unemployment by 44% against 39% for men.

Again, excluding from the sample individuals under a subsidized contract does not modify our results (see table 17).

Job search vs. human capital intensive. Then, we compare job-search oriented programs to human capital intensive training programs.⁵¹ Table 12 shows that, without accounting for unobserved heterogeneity, job-search oriented programs raise the transition rate out from unemployment by 10% while human capital intensive programs increase this transition by 43%. Accounting for unobserved heterogeneity makes both training effects even higher, as they respectively raise the transition rate out from unemployment by 23% and 60%. The difference is not significant but higher than in previous cases. Those results confirm that the least employable individuals are assigned to job-search oriented training programs, which explains the low effect of this type of training when we do not account for unobserved heterogeneity. Women, young job seekers and individuals holding a vocational degree or the baccalaureate are more likely to enroll into a human-capital intensive training program.

In line with the literature, we find a high *ex-post* effect of human capital intensive programs compared to job-search oriented ones. However, it is beyond the scope of this paper to provide evidence regarding the lock-in

⁵¹Job-search oriented programs include programs delivered in the general and business support domain, while human capital intensive programs recover the manufacturing, agriculture and tertiary domains.

effect induced by field specific programs, which might be important regarding their significant length. Indeed, they last 7 months on average, against 3 for job-search oriented training programs.

Table 18 shows that human capital intensive training programs include a higher share of on-the-job and certifying training compared to job-search oriented programs. Indeed, 70% of the former type of program include on-the-job training and 16% of programs preparing to a Ministry certification, compared to 55% and 10% for job-search oriented programs, respectively. Thus, human capital intensive programs efficiency can be first due to occupational skills acquisition, but also to the acquisition of practical experience through on-the-job training. Individuals preparing an examination to obtain a Ministry certification might benefit from high level skills acquisition as well as a better signaling.

5 Effect on unemployment recurrence

We now estimate the effect of different types of training programs on the transition rate *from employment to unemployment*.⁵² We want to check the hypothesis that training programs content can influence differently the matching between a firm and a worker. For example, the signaling effect of a certification is likely to reduce the employer's uncertainty regarding the workers' skills, which raises the match quality.

Specification. We define an employment spell as the duration between the transition to employment and the transition back to unemployment.⁵³ When we do not observe a transition to employment, the spell is right-censored. In our model, a job seeker finds a job after having followed a training program or without any training participation ; we measure the effect of such a training assignment on the duration of the subsequent employment spell t_3 . We thus specify the following transition rate from employment to unemployment :

$$h_{EU} = \alpha_{EU} * t_3^{\alpha_{EU}-1} * \exp[x' \beta_4 + \beta_{11} \cdot \mathbf{1}(TC = 1) + \beta_{12} \cdot \mathbf{1}(TNC = 1)]$$

The parameters of interest β_{11} and β_{12} respectively measure the effect of certifying and non-certifying training programs on job stability. A certifying training program decreases unemployment recurrence if $\beta_{11} < 0$, while $\beta_{11} > 0$ means that the program raises the probability that the individual will be back to the PES registers. At this stage of our analysis we do not consider unobserved heterogeneity.

Results. Table 19 shows that, without accounting for unobserved characteristics, training does not significantly influence the unemployment recurrence.⁵⁴ Further estimations considering unobserved heterogeneity is also required to validate those results. Though points estimates are not significant, it is relevant to find that programs including on-the-job training increase job stability if the individual is employed in the firm where he has previously been trained.

⁵²We make the assumption that the individual is under an employment contract between two unemployment spells.

⁵³In details, it corresponds to the difference between the PES register exit and entry dates. We now consider the first 10 unemployment spells of each individual in order to better identify our model.

⁵⁴It is also worthwhile to notice that, regarding the hazard rate out from unemployment, the effect of training program participation varies slightly compared to what was previously measured, which might be due to the fact that we almost consider all unemployment spells of each individual, while we were restricting to 4 spells in previous estimations.

6 Conclusion

In this study we compare the effect of different types of training programs on the hazard of exit from unemployment in France. Our data allow us to make the distinction between programs with and without certification preparation, experience within a firm and occupational skills transmission. Relying on the timing-of-events methodology, we account for observed and unobserved individual characteristics in order to measure the causal effect of training participation on the transition rate out from unemployment.

Our analysis show that among certifying training programs, those preparing to a Ministry certification are the most efficient ones. Additionally, programs delivering occupational skills and including experience within a firm also raise the probability to exit from unemployment. Those results have several policy implications : in France, a personal account provides funding for training participation to any program in a list elaborated by the training system actors. An important criteria for a program to be eligible is to prepare for a certification. The type of certification should thus be carefully considered, as the signal quality might vary a lot depending on the organization which delivers it. From a cost-benefit perspective, including the training length would allow to check whether those programs are also efficient at reducing the total duration of unemployment. On the other hand, raising job stability seems more cost-benefit on a longer term, as it reduces the number of individual unemployment spells. Further work should be implemented to measure the effect of training on job stability.

Appendix

A Descriptive statistics

Table 1: Certifying characteristics of training programs

	Share (in %)
No certif.	39.41
Ministry of Education	7.14
Ministry of Labor	3.13
Ministry of Agriculture	1.08
Ministry of Youth	1.32
Collective bargaining	2.23
Others	45.69
Total	100.00

Source: FHS, 2009-2014

Table 2: Number of unemployment spells per individual

	Share (%)	Cumulative share (%)
1	35.25	35.25
2	28.57	63.82
3	17.65	81.48
4	10.06	91.54
5	4.64	96.18
6	2.11	98.28
7	0.88	99.17
8	0.46	99.62
9	0.19	99.81
10 and more	0.19	100.00
Total	100.00	100.00

Source: FHS, 2009-2014

Table 3: Number of training programs by individual during an unemployment spell

	Share (%)
1	93.79
2	5.79
3	0.41
4	0.01
Total	100.00

Source: FHS, 2009-2014

Table 4: Training program characteristics by training field

	Duration	On-the-job	Certif.	Share level IV	%
General	3.62	0.58	0.52	0.34	16.04
Manufacturing or agriculture	4.97	0.70	0.66	0.61	15.07
Business support	3.18	0.53	0.63	0.49	32.13
Tertiary domain	8.17	0.69	0.71	0.54	30.25
Unknown	2.94	0.90	0.11	0.10	6.51
Total	5.01	0.64	0.61	0.47	100.00
N	10601	10601	10601	10601	10601

Source: FHS, 2009-2014. This table reports the duration in months of training programs, the share of programs including on-the-job training, preparing for a certification, and the share of programs aiming at the acquisition of a level IV. A level IV diploma is equivalent to the French baccalaureate.

Table 5: Most frequent training programs, with and without preparation for a certification

	Certif.	No certif.
1	Assistant-nurse	Career guidance
2	Nurse	Job seeking support
3	Homecare assistant	Firm creation
4	Career guidance	Assistant-nurse
5	Forklift truck driving	Office automation software
	N =6423	N =4178

Source: FHS, 2009-2014.

Table 6: Program concentration : share of the three most assigned training programs in each field

	All (in%)	Certifying only (in%)
General	45.6	45.6
Manufact./agric.	11.2	10.4
Business supp.	18.0	17.5
Tertiary	33.1	33.1

Source: FHS, 2009-2014. *Note:* This table reports the share of the three most assigned training programs in each field, which provides an intuition of the diversity of training programs options in each field. This share is also reported when restricting the sample to programs preparing for a certification.

Table 7: Training program durations (in months) according to certification and on-the-job training

	Total		On-the-job only	
	%	Duration	%	Duration
No certif.	39.4	3.6	43.6	4.2
Certif.	60.6	5.9	56.4	7.0
<i>Ministry certif. only</i>	12.7	7.6	13.7	8.0
Total	100.0	5.0	100.0	5.8

Source: FHS, 2009-2014.

Table 8: Probability to access to training by individual characteristics (OLS regression)

	Training	Certif.training	Ministry certif. training	On-the-job training
Female	0.002*	0.021**	0.014**	0.048***
Age 25-35	0.011***	0.019	0.001	-0.073***
Age 35-45	0.020***	-0.002	-0.019**	-0.113***
Age 45-55	0.014***	-0.017	-0.033***	-0.149***
Initial level : III	0.017***	-0.027	-0.029**	0.006
Initial level : IV	0.021***	0.008	-0.050***	0.062***
Initial level : V/Vbis	0.010***	-0.042***	-0.069***	0.050***
Initial level : VI	-0.005***	-0.073***	-0.087***	0.089***
Unemployment recurrence	-0.029***	-0.019*	0.008	0.029***
Foreigner	-0.016***	-0.019	-0.009	-0.020
Const.	0.047***	0.626***	0.176***	0.628***
<i>N</i>	220991	10601	10601	10601

Source: FHS, 2009-2014. *Note:* Standard errors are clustered at the individual level.

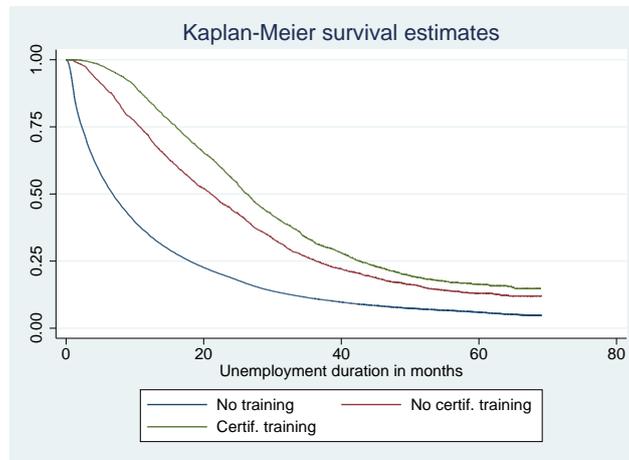
Table 9: Determinants of training enrollment by type of training (OLS regression)

	General	Manuf./Agric.	Business supp.	Tertiary
Female	0.041***	-0.207***	-0.098***	0.280***
Age 25-35	-0.042***	0.004	0.104***	-0.059***
Age 35-45	-0.009	-0.014	0.130***	-0.096***
Age 45-55	0.043***	-0.042***	0.147***	-0.117***
Initial level : III	-0.063***	0.023**	0.027	-0.007
Initial level : IV	-0.110***	0.036***	-0.008	0.082***
Initial level : V/Vbis	-0.071***	0.059***	-0.016	0.015
Initial level : VI	-0.016	0.045***	-0.047**	0.014
Unemployment recurrence	0.005	0.013*	0.004	-0.026***
Foreigner	0.029**	-0.012	-0.026	0.036**
Const.	0.212***	0.220***	0.295***	0.199***
N	10601	10601	10601	10601

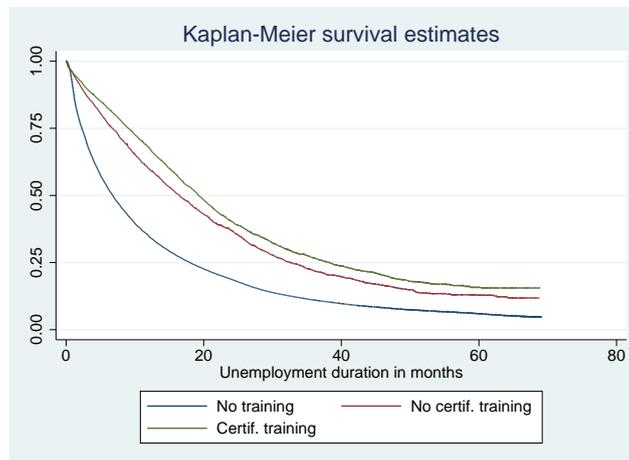
Source: FHS, 2009-2014. Note: Standard errors are clustered at the individual level.

Figure 1: Kaplan-Meier estimation of the probability to leave unemployment, by certifying training participation (N=220 991)

(a) With training duration



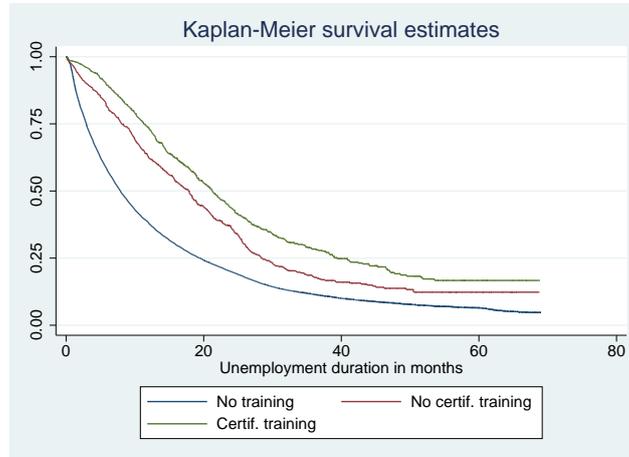
(b) Without training duration



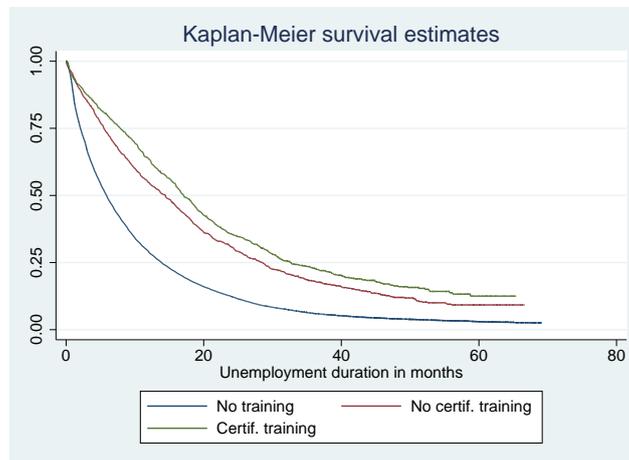
Source: FHS, 2009-2014.

Figure 2: Kaplan-Meier estimation of the hazard of leaving unemployment, by certifying training participation, excluding training duration (N=220 991)

(a) Highest quartile reservation wage



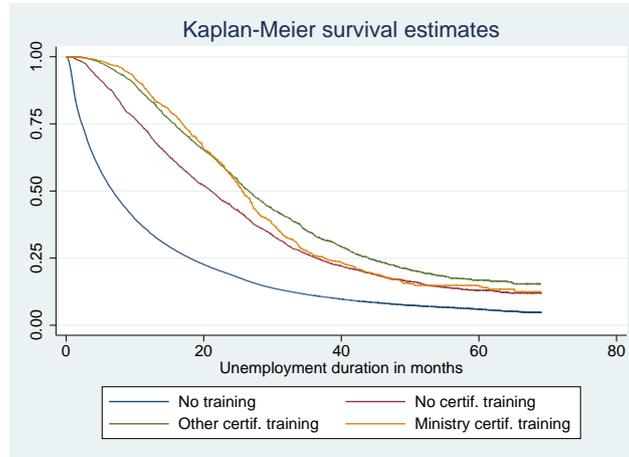
(b) Lowest quartile reservation wage



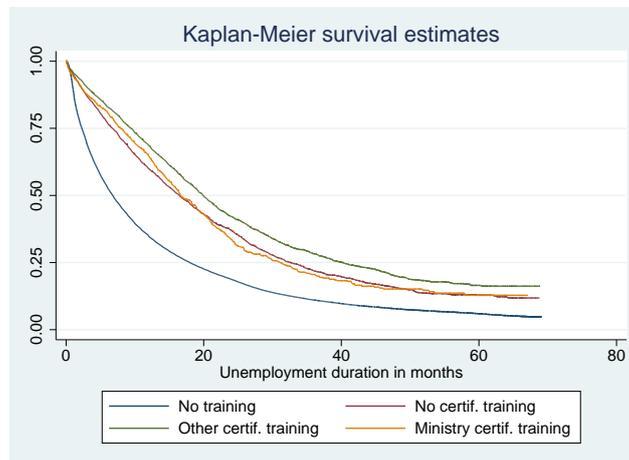
Source: FHS, 2009-2014.

Figure 3: Kaplan-Meier estimation of the hazard of leaving unemployment, by certifying training participation and type of certification prepared (N=220 991)

(a) With training duration



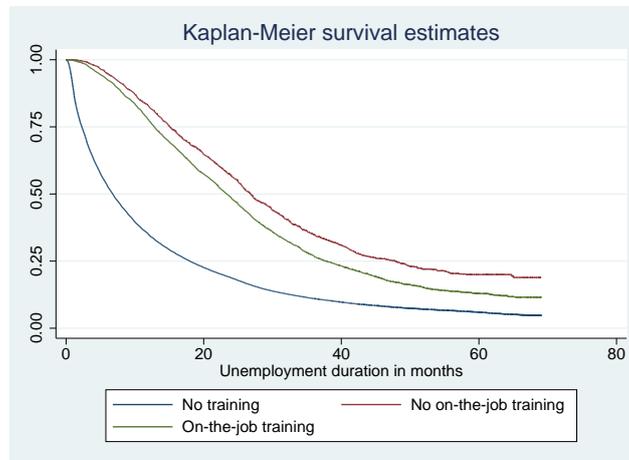
(b) Without training duration



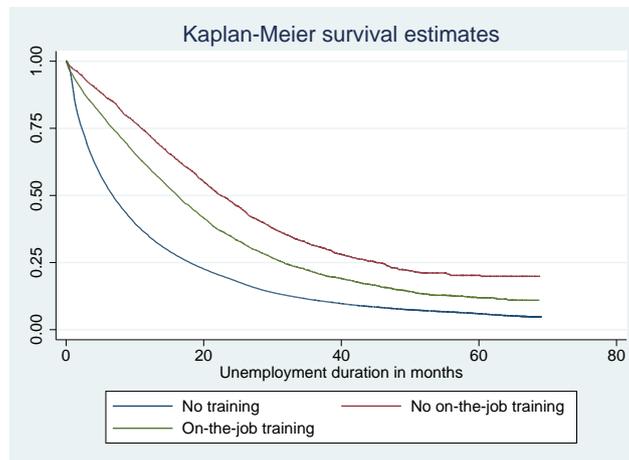
Source: FHS, 2009-2014.

Figure 4: Kaplan-Meier estimation of the hazard of leaving unemployment, by on-the-job training program participation (N=220 991)

(a) With training duration

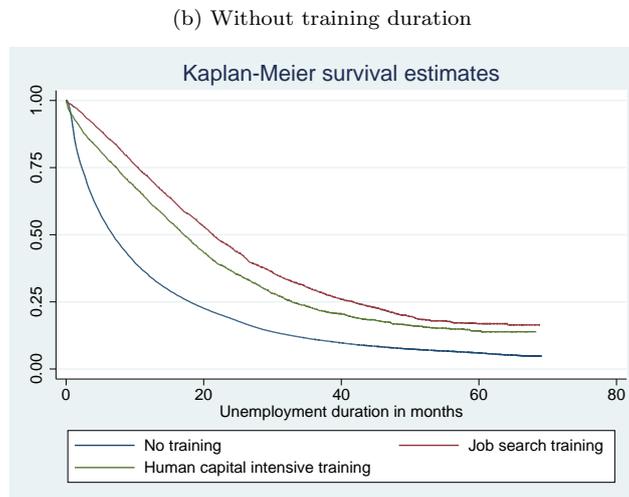
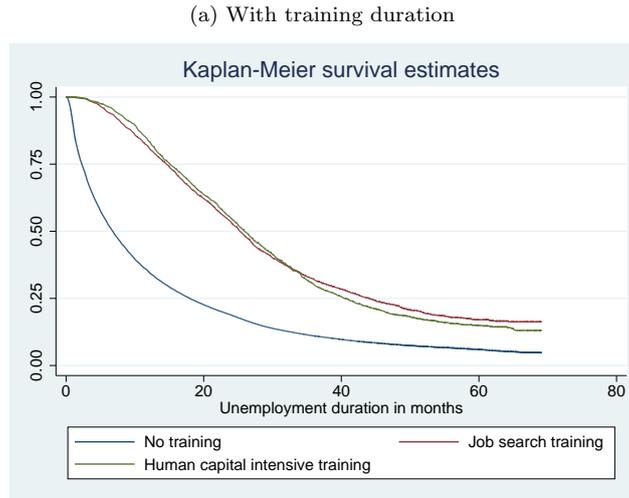


(b) Without training duration



Source: FHS, 2009-2014.

Figure 5: Kaplan-Meier estimation of the hazard of leaving unemployment, by training field (N=220 991)



Source: FHS, 2009-2014.

Table 10: *Certifying* program durations (in months), by training field

	Pre-training	Training	Post-training	Total
General	8.7	4.2	10.8	23.8
Manuf./agric.	9.2	5.4	8.4	23.1
Business supp.	9.5	3.5	9.2	22.2
Tertiary	8.3	8.8	6.1	23.2
Unknown	8.4	11.9	6.3	26.7
Total	8.9	5.9	8.2	23.0

Source: FHS, 2009-2014.

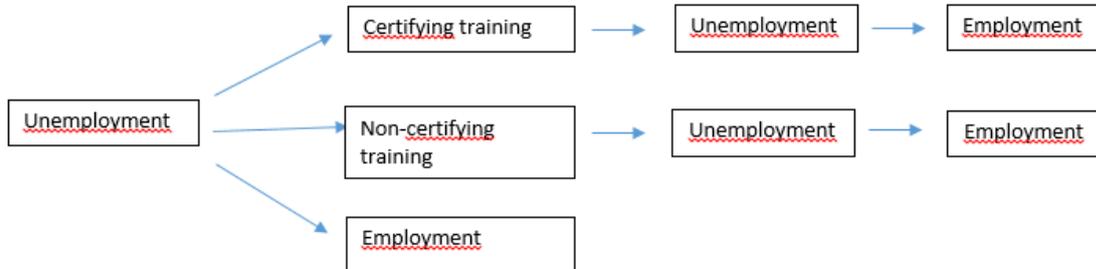
Table 11: *Non-certifying* program durations (in months), by training field

	Pre-training	Training	Post-training	Total
General	9.3	2.9	10.5	22.7
Manuf./agric.	9.2	4.1	9.3	22.6
Business supp.	8.8	2.6	9.9	21.2
Tertiary	7.6	6.6	8.3	22.5
Unknown	5.4	1.8	4.9	12.2
Total	8.2	3.6	8.8	20.6

Source: FHS, 2009-2014.

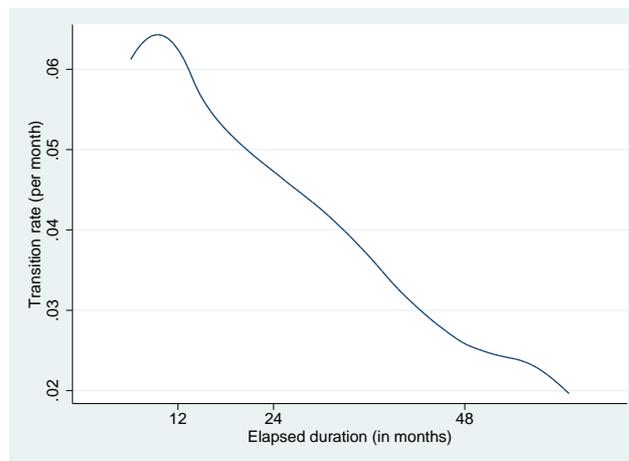
B Unemployment spells

Figure 6: Observed transitions from unemployment to training and employment



Source: FHS, 2009-2014. Note: We do not account for training program drop out and further assume that all individuals go back to unemployment after the end of the program. We further assume that individuals find a job when they leave the PES register.

Figure 7: Nonparametric estimate of the transition rate from unemployment to exit from unemployment (N=220 991)



Source: FHS, 2009-2014.

C Log likelihood contribution

We specify three survival functions. First, when the individual is unemployed he faces three "risks", leaving unemployment, entering a certifying training program and entering a non-certifying training program. We account for the fact that until the time considered, the individual has survived these three risks. We thus have :

$$\begin{aligned} S_{UE} &= \exp[-\exp(x'\beta_0 + \nu_{UE}) * t^{\alpha_{UE}} - \exp(x'\beta_{TC} + \nu_{UTC}) * t^{\alpha_{UTC}} \\ &\quad - \exp(x'\beta_{TNC} + \nu_{UTNC}) * t^{\alpha_{UTNC}}] \\ S_{UT} &= \exp[-\exp(x'\beta_0 + \nu_{UE}) * t_{p1}^{\alpha_{UE}} - \exp(x'\beta_{TC} + \nu_{UTC}) * t_{p1}^{\alpha_{UTC}} \\ &\quad - \exp(x'\beta_{TNC} + \nu_{UTNC}) * t_{p1}^{\alpha_{UTNC}}] \end{aligned}$$

With S_{UE} the probability of having survived until time t before exiting unemployment and S_{UT} the probability to have survived until time t_{p1} before entering into a certifying program, or until t_{p2} before entering into a non-certifying program.

If an individual follows a training program, we account for this effect when he is looking for a job again. we specify a different survival function such as :

$$S_{UTE} = \exp[-\exp(x'\beta_0 + \beta_{01} \cdot \mathbf{1}(t > t_{e1})(TC = 1) + \beta_{02} \cdot \mathbf{1}(t > t_{e1})(TNC = 1) + \nu_{UE}) * (t^{\alpha_{UE}} - t_{e1}^{\alpha_{UE}})]$$

S_{UTE} differs from S_{UE} as once an individual has followed a training program, we make the assumption that he does not follow another program afterwards, thus he does not face a competing but single risk once exiting from a training program. Moreover, as we are looking at the ex-post effect of both types of training program, we stop the clock during training.

The likelihood function for one individual spell is :

$$L = (h_{UE})^{\delta=1} * (h_{UTC})^{TC=1} * (h_{UTNC})^{TNC=1} * (S_{UE})^{training=0} * (S_{UT} * S_{UTE})^{training=1}$$

with $\delta = 1$ if the unemployment spell is not censored, i.e if we observe the individual exiting from unemployment. $TC = 1$ and $TNC = 1$ if the individual follows a certifying or non-certifying program, respectively.

We set L_{jkl} as the likelihood function for one type jkl , according to unobserved heterogeneity associated to transition to employment, certifying and non-certifying training programs. Accounting for unobserved heterogeneity, an individual contribution to the likelihood is thus :

$$L_{jkl}^{global} = \left(\prod_{sp} L_{jkl} \right) * \pi_{jkl}$$

Where Sp is the total number of spells for each individual, which we restrict to 4, and π_{jkl} is the normalized probability to be characterized by a specific combination of unobserved characteristics V_{UE} , V_{UTC} and V_{UTNC} .

The combination of each mass point gives 8 types of unobserved heterogeneity. The global likelihood function for N individuals is thus :

$$L = \sum_{n=1}^N \ln \left(\sum_{jkl} L_{jkl}^{global} \right)$$

D Unobserved heterogeneity specification considering three competing events

When estimating the effect of three different treatments, i.e Ministry certifying, other certifying and non-certifying programs, we make the hypothesis that whatever his employability, an individual cannot attend more than one type of training program. We assume that he has a positive probability to attend only one of the three types of programs, or that those probabilities are all null. This assumption is all the more relevant that in our framework an individual can only follow only one training program during his unemployment spell. Let V_{UTCM} and V_{UTCO} respectively correspond to unobserved characteristics associated to Ministry certifying and other certifying programs. V_{UTNC} still reflects the unobserved characteristics associated to non-certifying programs participation, and V_{UE} to exit from unemployment. Assuming that V_{UE} , V_{UTCM} , V_{UTCO} and V_{UTNC} are distributed on $\{-1; 1\}$, we thus assume that the last three unobserved characteristics cannot take a positive value at the same time.

There are thus 8 probabilities associated to individuals' unobserved characteristics :

$$\begin{aligned} \pi_1(\nu_{UE} = -1, \nu_{UTCM} = -1, \nu_{UTCO} = -1, \nu_{UTNC} = -1) \\ \pi_2(\nu_{UE} = -1, \nu_{UTCM} = \mathbf{1}, \nu_{UTCO} = -1, \nu_{UTNC} = -1) \\ \pi_3(\nu_{UE} = -1, \nu_{UTCM} = -1, \nu_{UTCO} = \mathbf{1}, \nu_{UTNC} = -1) \\ \pi_4(\nu_{UE} = -1, \nu_{UTCM} = -1, \nu_{UTCO} = -1, \nu_{UTNC} = \mathbf{1}) \\ \pi_5(\nu_{UE} = \mathbf{1}, \nu_{UTCM} = -1, \nu_{UTCO} = -1, \nu_{UTNC} = \mathbf{1}) \\ \pi_6(\nu_{UE} = \mathbf{1}, \nu_{UTCM} = \mathbf{1}, \nu_{UTCO} = -1, \nu_{UTNC} = -1) \\ \pi_7(\nu_{UE} = \mathbf{1}, \nu_{UTCM} = -1, \nu_{UTCO} = -1, \nu_{UTNC} = -1) \\ \pi_8(\nu_{UE} = \mathbf{1}, \nu_{UTCM} = -1, \nu_{UTCO} = \mathbf{1}, \nu_{UTNC} = -1) \end{aligned}$$

For example, the probability $\pi_4(\nu_{UE} = -1, \nu_{UTCM} = -1, \nu_{UTCO} = -1, \nu_{UTNC} = 1)$ is the probability for an individual to have negative unobserved characteristics for employment and entry into both certifying training programs, but positive unobserved characteristics for entry into a non-certifying training program.

We parameterize those probabilities as a multinomial logit in order that they each range between 0 and 1, and that they sum to one. It gives the following specification :

$$\pi_m = \frac{\exp(pb_m)}{\sum_{m=1}^8 \exp(pb_m)}$$

with $m = \{1, 2, 3, 4, 5, 6, 7, 8\}$ and $pb_8 = 0$.

E Results

Table 12: Effect of training programs according to their content on the unemployment-employment transition rate (220 991 spells and N=132 706 individuals)

	Without unobs.	With unobs.	P-values diff.
One training	0.271*** (0,010)	0.325*** (0,047)	
Certifying training	0.239*** (0,013)	0.282*** (0,052)	0.9206349
Non-certifying	0.315*** (0,014)	0.329*** (0,153)	
On-the-job training	0.341*** (0,011)	0.354*** (0,017)	0.310543
Without on-the-job training	0.131*** (0,019)	0.139*** (0,028)	
Job search oriented	0.099*** (0,015)	0.207*** (0,019)	0.1663152
Human capital intensive	0.359*** (0,014)	0.470*** (0,017)	

Source: FHS, 2009-2014. Note: Standard errors are in parentheses. *, ** and *** denote significance at the 10, 5, and 1% level, respectively. We control for the year at which the individual enters unemployment, and for the unemployment rate in the department when he enters unemployment.

Table 13: Unobserved heterogeneity distribution

	(1) Certifying training	(2) On-the-job training	(3) Job-search training
π_{135}	0.107	0.154	0.503
π_{145}	0.000	0.000	0.000
π_{136}	0.367	0.013	0.000
π_{146}	0.030	0.332	0.000
π_{235}	0.000	0.015	0.493
π_{245}	0.000	0.183	0.004
π_{236}	0.489	0.303	0.000
π_{246}	0.007	0.000	0.000
ν_{UE}^1	-1.014	-2.403	-1.014
ν_{UE}^2	-2.405	-1.016	-2.402
ν_{UTC}^3	-5.472	-4.103	-5.719
ν_{UTC}^4	-3.420	-6.587	-2.352
ν_{UTNC}^5	-4.177	-5.361	-5.476
ν_{UTNC}^6	-5.787	-9.854	-1.834

Source: FHS, 2009-2014. Note: π_{jkl} is the normalized probability of the joint distribution of the unobserved heterogeneity terms ν_{UE}^j , ν_{UTC}^k and ν_{UTNC}^l . ν_{UE} corresponds to the unobserved heterogeneity term associated to employability. In column (1), ν_{UTC} ν_{UTNC} corresponds to the unobserved heterogeneity term associated to certifying training (non-certifying training) participation. In column (2), ν_{UTC} ν_{UTNC} corresponds to the unobserved heterogeneity term associated to programs including (which do not include) on-the-job training participation. In column (3), ν_{UTC} ν_{UTNC} corresponds to the unobserved heterogeneity term associated to job-search oriented program (human capital intensive program) participation.

Table 14: Effect of training programs according to their content on the unemployment-employment transition rate, detailed results (220 991 spells and N=132 706 individuals)

	(1)	(2)	(3)
	Certifying training	On-the-job training	Job-search training
β_0 Age : 30-44	-0.547*** (0,007)	-0.550*** (0,007)	-0.551*** (0,007)
β_0 Age : 45-55	-0.870*** (0,010)	-0.867*** (0,009)	-0.866*** (0,009)
β_0 Woman	-0.035*** (0,007)	-0.035*** (0,006)	-0.036*** (0,006)
β_0 No diploma	0.145*** (0,022)	0.143*** (0,009)	0.146*** (0,009)
β_0 Bac,CAP,BEP	-0.047*** (0,017)	-0.051*** (0,007)	-0.049*** (0,008)
β_0 Unemp.recurr.	-0.077*** (0,014)	-0.081*** (0,006)	-0.080*** (0,006)
β_1 Age : 30-44	-0.119 (0,299)	-0.292*** (0,029)	0.061* (0,033)
β_1 Age : 45-55	-0.443 (0,536)	-0.621*** (0,041)	-0.032 (0,042)
β_1 Woman	0.069 (0,078)	0.106*** (0,026)	-0.112*** (0,029)
β_1 No diploma	-0.472* (0,266)	-0.279*** (0,046)	-0.544*** (0,052)
β_1 Bac,CAP,BEP	0.090 (0,290)	0.176*** (0,030)	-0.114*** (0,033)
β_1 Unemp.recurr.	-0.624*** (0,025)	-0.610*** (0,026)	-0.531*** (0,029)
β_2 Age : 30-44	-0.168 (0,158)	0.100*** (0,039)	-0.284*** (0,032)
β_2 Age : 45-55	-0.337 (0,402)	-0.078 (0,051)	-0.696*** (0,048)
β_2 Woman	-0.041 (0,133)	-0.122*** (0,035)	0.196*** (0,029)
β_2 No diploma	-0.262 (0,991)	-0.640*** (0,062)	-0.222*** (0,054)
β_2 Bac,CAP,BEP	0.090 (0,365)	-0.097** (0,039)	0.302*** (0,035)
β_2 Unemp.recurr.	-0.540*** (0,106)	-0.712*** (0,035)	-0.619*** (0,030)
β_{01} Type 1 training	0.282*** (0,052)	0.354*** (0,017)	0.207*** (0,019)
β_{02} Type 2 training	0.329** (0,153)	0.139*** (0,028)	0.470*** (0,017)
Log likelihood	-672799.7	-672271.7	-667114.1

Source: FHS, 2009-2014. Note: Standard errors are in parentheses. *, ** and *** denote significance at the 10, 5, and 1% level, respectively. We control for the year at which the individual enters unemployment, and for the unemployment rate in the department when he enters unemployment. For columns (1), (2), (3), type 1 training program corresponds to certifying training, on-the-job training and job-search oriented training programs, respectively. Type 2 training program corresponds to non-certifying training, programs without on-the-job training and human capital intensive training programs, respectively.

Table 15: Effect of certifying and on-the-job training programs, depending on gender (220 991 spells and N=132 706 individuals)

	Female	Male
Certifying training	0.310*** (0,027)	0.156*** (0,031)
Non-certifying	0.260*** (0,030)	0.395*** (0,033)
On-the-job training	0.363*** (0,023)	0.330*** (0,025)
Without on-the-job training	0.129*** (0,042)	0.142*** (0,038)
N	109 910	111 081

Source: FHS, 2009-2014. *Note:* Standard errors are in parentheses. *, ** and *** denote significance at the 10, 5, and 1% level, respectively. We control for the year at which the individual enters unemployment, and for the unemployment rate in the department when he enters unemployment.

Table 16: Effect of certifying training programs on the unemployment-employment transition, by type of certification (220 991 spells and N=132 706 individuals)

	Certifying training	
β_0 Const.	-2.104***	(0,015)
β_0 Age : 30-44	-0.690***	(0,009)
β_0 Age : 45-55	-1.062***	(0,013)
β_0 Woman	-0.010	(0,008)
β_0 No diploma	0.195***	(0,012)
β_0 Bac,CAP,BEP	-0.023**	(0,009)
β_0 Unemp.recurr.	-0.278***	(0,008)
β_1 Const.	-5.360**	(2,262)
β_1 Age : 30-44	-0.258***	(0,075)
β_1 Age : 45-55	-0.679***	(0,118)
β_1 Woman	0.162**	(0,069)
β_1 No diploma	-0.918***	(0,147)
β_1 Bac,CAP,BEP	-0.242***	(0,075)
β_1 Unemp.recurr.	-0.078	(0,070)
β_2 Const.	-5.131***	(0,314)
β_2 Age : 30-44	-0.056	(0,039)
β_2 Age : 45-55	-0.314***	(0,053)
β_2 Woman	0.056	(0,035)
β_2 No diploma	-0.417***	(0,065)
β_2 Bac,CAP,BEP	0.125***	(0,040)
β_2 Unemp.recurr.	-0.161***	(0,037)
β_3 Const.	-5.801***	(1,802)
β_3 Age : 30-44	-0.213***	(0,042)
β_3 Age : 45-55	-0.406***	(0,056)
β_3 Woman	-0.097***	(0,038)
β_3 No diploma	-0.266***	(0,066)
β_3 Bac,CAP,BEP	0.056	(0,043)
β_3 Unemp.recurr.	-0.229***	(0,040)
β_{001} Ministry certif.	0.426***	(0,047)
β_{002} Other certif.	0.259***	(0,027)
β_{003} No certif.	0.256***	(0,025)
Log likelihood	-428409.5	

Source: FHS, 2009-2014. Note: Standard errors are in parentheses. *, ** and *** denote significance at the 10, 5, and 1% level, respectively. We control for the year at which the individual enters unemployment ; we also control for a dummy which is equal to one if the unemployment rate in the department when he enters unemployment is superior to the median level of unemployment observed during the period.

Table 17: Effect of a certifying training program on the unemployment-employment transition rate, sample excluding category 5 individuals (N=124 867)

	Certifying training	On-the-job training
β_0 Age : 30-44	-0.532*** (0,007)	-0.472*** (0,007)
β_0 Age : 45-55	-0.866*** (0,009)	-0.776*** (0,009)
β_0 Woman	-0.052*** (0,006)	-0.091*** (0,006)
β_0 No diploma	0.131*** (0,010)	0.141*** (0,009)
β_0 Bac,CAP,BEP	-0.045*** (0,008)	-0.102*** (0,007)
β_0 Unemp.recurr.	-0.118*** (0,006)	-0.121*** (0,006)
β_1 Age : 30-44	-0.074** (0,032)	-0.287*** (0,029)
β_1 Age : 45-55	-0.403*** (0,045)	-0.731*** (0,043)
β_1 Woman	0.022 (0,028)	(0,038) (0,026)
β_1 No diploma	-0.629*** (0,053)	-0.458*** (0,047)
β_1 Bac,CAP,BEP	0.067** (0,032)	0.068** (0,030)
β_1 Unemp.recurr.	-0.706*** (0,029)	-0.624*** (0,026)
β_2 Age : 30-44	-0.223*** (0,038)	0.115*** (0,040)
β_2 Age : 45-55	-0.431*** (0,053)	-0.005 (0,053)
β_2 Woman	-0.084** (0,034)	-0.196*** (0,036)
β_2 No diploma	-0.433*** (0,060)	-0.995*** (0,067)
β_2 Bac,CAP,BEP	0.084** (0,040)	-0.215*** (0,040)
β_2 Unemp.recurr.	-0.649*** (0,034)	-0.705*** (0,037)
β_{01} Type 1 training	0.321*** (0,019)	0.423*** (0,015)
β_{02} Type 2 training	0.387*** (0,021)	0.161*** (0,027)
Log likelihood	-616167.9	-616163.2

Source: FHS, 2009-2014. Note: Standard errors are in parentheses. *, ** and *** denote significance at the 10, 5, and 1% level, respectively. We control for the year at which the individual enters unemployment ; we also control for a dummy which is equal to one if the unemployment rate in the department when he enters unemployment is superior to the median level of unemployment observed during the period.

Table 18: Training content according to the training domain (in shares)

	Job-search oriented	Human capital intensive	Total
On-the-job training	0.55	0.69	0.62
Ministry certifying	0.10	0.16	0.13

Source: FHS, 2009-2014.

Table 19: Effect of training participation on the employment-unemployment transition rate, according to the training content (229 498 spells and N=132 706 individuals)

	All programs	Certifying training	On-the-job training	Two types training
β_4 Const.	-3.350*** (0,021)	-3.344*** (0,066)	-3.338*** (0,066)	-3.310*** (0,067)
β_4 Age : 30-44	-0.131*** (0,006)	-0.143*** (0,020)	-0.121*** (0,020)	-0.154*** (0,019)
β_4 Age : 45-55	-0.338*** (0,009)	-0.344*** (0,029)	-0.335*** (0,029)	-0.380*** (0,030)
β_4 Woman	-0.038*** (0,006)	0.019 (0,017)	-0.058*** (0,018)	-0.090*** (0,018)
β_4 No diploma	0.552*** (0,009)	0.509*** (0,028)	0.612*** (0,028)	0.559*** (0,028)
β_4 Bac,CAP,BEP	0.399*** (0,007)	0.388*** (0,023)	0.399*** (0,024)	0.401*** (0,023)
β_4 Unemp.recurr.	0.373*** (0,006)	0.365*** (0,020)	0.402*** (0,020)	0.362*** (0,020)
β_{01} Type 1 training	0.269*** (0,010)	0.286*** (0,041)	0.349*** (0,035)	0.087* (0,049)
β_{02} Type 2 training	- -	0.369*** (0,042)	0.267*** (0,064)	0.289*** (0,043)
β_{11} Type 1 training	-0.011 (0,016)	0.089 (0,066)	-0.026 (0,060)	-0.070 (0,080)
β_{12} Type 2 training	- -	-0.019 (0,074)	-0.010 (0,100)	0.025 (0,079)

Source: FHS, 2009-2014. Note: Standard errors are in parentheses. *, ** and *** denote significance at the 10, 5, and 1% level, respectively. We control for the year at which the individual enters unemployment, and for the unemployment rate in the department when he enters unemployment.

F Dropout

F.1 Defining dropout

We say that an individual dropped from his training program when the program theoretically ends later than the observed date of training exit, and when the difference between both dates is larger than 15 days. When the difference is smaller than 15 days we assume that it is a mismeasurement error and consider that the individual did not drop from the program.

Dropout can be followed by two situations : the individual returns back to unemployment (3,6% of the sample, see table 20) or he directly finds a job (5,1%). We assume that the individual finds a job right after training when the training program theoretically ends after the observed end of the unemployment spell. On the contrary, we suppose that he went back to unemployment if he is still observed unemployed right after the end of the training program.

F.2 Descriptive statistics

We look at individual characteristics of trainees dropping from their training program, as well as training programs characteristics. Training duration explains that some individuals leave the program before the end, however it appears that employable individuals, participating to high quality programs, might find a job before its completion.

Individuals who leave training were supposed to follow longer training programs than average (table 21). It is especially the case when they exit from the program because they found a job : the average training program lasts 5 months against 16,4 months in their case, theoretically. On average, a job seeker leaves the program at half of the program. Table 22 shows that trainees who find a job while being trained are younger and more educated than average, which corresponds to the most employable individuals in the population. It is also possible that the lock-in effect is less relevant in the case of more autonomous individuals who keep on looking for a job during the training program. Finally, the training program content also has an incidence on the drop out probability : there are 1.5% more individuals who leave a certifying program for a job than in non-certifying programs (see table 23). It is also the case for programs including experience within a firm. One possible explanation is that individuals enrolling in those training programs also present unobserved characteristics which increase their transition rate out from unemployment. In the case of certifying training programs, another explanation is also that even if the individual does not obtain the certification, following a certifying training program is a sufficient positive signal for the employer.

Table 20: Share of individuals dropping from their training program

	Share (%)
To unemployment	3.55
To exit from unemp.	5.15

Source: FHS, 2009-2014.

Table 21: Observed and theoretical training programs durations (in months)

	Observed	Theoretical
Droppers for unemployment	4.1	9.5
Droppers for employment	7.9	16.4
Non-droppers	5.0	5.0

Source: FHS, 2009-2014. *Note:* This table reports the theoretical and observed training programs durations for individuals leaving the program and coming back to unemployment, leaving the program and exiting from unemployment, and for individuals who complete the program.

Table 22: Determinants of the probability to drop from a training program in order to enter employment or to reenter unemployment

	To empl.	To unempl.
Female	0.014*** (0.00)	0.001 (0.00)
Age 25-35	-0.027*** (0.00)	-0.005 (0.01)
Age 35-45	-0.035*** (0.01)	-0.007 (0.01)
Age 45-55	-0.037*** (0.01)	-0.008 (0.01)
No diploma	-0.016** (0.01)	-0.002 (0.01)
BAC,BEP,CAP	-0.012*** (0.00)	0.004 (0.01)
Unemployment recurrence	-0.006* (0.00)	0.007 (0.00)
Foreigner	-0.000 (0.01)	-0.004 (0.01)
Const.	0.063*** (0.01)	0.051*** (0.01)
N	10601	10601

Source: FHS, 2009-2014. *Note:* Standard errors are in parentheses. *, ** and *** denote significance at the 10, 5, and 1% level, respectively.

Table 23: Dropout rate by type of training program, mean test

	Certifying	Only Ministry certif.	On-the-job
Droppers for unemployment	-0.006	-0.014**	-0.004
Droppers for employment	-0.015***	-0.016***	-0.015***
<i>N</i>	10601	10601	10601

Source: FHS, 2009-2014. *Note:* The difference corresponds to the difference between the outcome mean of the trainees in non-certifying (without-on-the-job training) programs and the outcome mean of the trainees in certifying programs (with on-the-job training). *, ** and *** denote significance of the difference at the 10, 5, and 1% level, respectively.

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