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THE IMPACT OF TRAINING PROGRAMMES ON WAGES IN FRANCE: AN EVALUATION OF THE "QUALIFYING CONTRACT" USING PROPENSITY SCORES

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Abstract:

This paper evaluates the impact of a widely-used French training programme for youth on earnings. This programme is designed to increase labour market experience and education, validated by a formal diploma. It is not sure, however, whether this diploma and a similar diploma acquired through initial training have the same effect on post-training wages. To answer this question, we contrast the 2003 net wages of a group of participants enrolled in 1998 (the "treatment" group) to the 2003 net wages of a control group. The controls are individuals who completed their initial training in 1998 with diplomas similar to those obtained by the treated at the end of the programme. *Using propensity score matching, we find a significantly positive effect of the treatment on the treated: participants in the programme benefit, five years after participation, from a positive wage premium. This suggests that firms do not simply value education: they value it more if it is coupled with some degree of labour market experience.*

Keywords: active labour market policies; training programmes for youth; propensity score matching.

JEL-Codes: J68, I28, C14, C21

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1. Introduction

Among the broad literature dedicated to the evaluation of active labour market policies in Northern America and in Europe, a large body of work has focused on policies targeting unemployed young persons. These policies often take the form of training programmes, designed to increase youth labour market experience and human capital, through either on-the-job training or a mix of on-the-job training and classroom education. Several studies have used propensity score matching techniques to estimate the impact of these training programmes on subsequent earnings. These studies have yielded mixed results: the impact seems to vary hugely not only across countries, but also across programmes.

In France, training programmes do exist, but there have been very few studies dedicated to their evaluation. Existing studies have focused on apprenticeship contracts, i.e. specific contacts that generally take place during a young person's initial training period, and involve part-time work in a firm and part-time classroom education. They generally conclude that these contracts have no effect on post-training wages.

In the present study, we focus on another widely-used French training programme for youth, the so-called "Qualifying Contract". This programme targets individuals aged 16-25 who either do not have any diploma, or are unemployed with a low-level diploma. Using original data from two different national surveys, we estimate the impact of this programme on wages five years after enrolment, using propensity score matching techniques. The paper is organised as follows: Section 2 gives a brief overview of literature, and states the objective of our research, while Section 3 describes the programme we intend to evaluate. Section 4 is dedicated to the presentation of our econometric analysis and empirical strategy, while Section 5 gives details on the construction of our database. Results are presented and commented in Section 6, and conclusion given in a final section.

2. Review of the Literature and Objective of The Research

The evaluation of active labour market programmes for youth has given rise to a very large body of literature, in the United States but also in Europe – and especially in northern Europe. Among this literature, several papers have been dedicated to the evaluation of training programmes, either in terms of employment probabilities or in terms of earnings (Smith, 2000). These evaluations have yielded mixed results.

For instance, Larsson (2003) studies two Swedish training programmes, youth practice and labour market training, using propensity score matching. She finds negative short-term impacts of both programmes on earnings (one year after the start of the programme), but no

significant long-term impacts. Estimating similar programmes in Norway, Raaum *et al.* (2002) found that their impact on post-training earnings (i) was not significantly different from zero for new entrants on the labour market, but (ii) was positive and persistent for participants with some (recent) labour market experience. According to Hämäläinen and Ollikainen (2004), labour market training for youth in Finland increases significantly and persistently the annual earnings of the treated.

Although all of these studies rely on the same methodology (propensity score matching), their results are somewhat mixed: training programmes do seem to have an impact, but the direction and magnitude of this programme varies according to countries and to the targeted population. Therefore, the question of the impact of youth training programmes on wages remains an important issue. The objective of this paper is to contribute to a better knowledge of this issue, by examing the French case.

In France, there have been very few studies dedicated to the evaluation of training programmes, and, to our knowledge, none using propensity score matching (see Fougère *et al.*, 2000, for a survey). Existing studies focus on apprenticeship contracts, which is one of the two most representative French training programmes. When they occur, these contracts are generally part of a young person's initial training, and involve part-time work in a firm and part-time classroom education. Empirical evaluation generally conclude that these contracts have no effect on post-training wages.

In the present paper, we will focus on what can be considered (according for instance, to Fougère *et al.*, 2000) as the other most representative French training programme: the "qualifying contract" or CQ[1], which we describe in the next section. The impact of this programme on wages has not been studied yet, and remains a concern. We try to address this issue here, using propensity matching methods on an original dataset, obtained by merging two national databases.

More precisely, we want to compare two different populations:

(i) on the one hand, youth who enter the training programme at time t with a certain education level, and obtained a higher education level (acknowledged by a formal diploma) at the end of the programme, at time $t + 1$.

(ii) on the other, youth who left school at time t with education levels similar to those obtained by the participants *at the end* of the programme, at time $t + 1$.

[1] Abbreviation for the French denomination of the programme: "Contrat de Qualification".

By comparing the respective wages of these these two populations at a later period (time $t + 5$), we hope to evaluate the effect of participation in a Qualifying Contract on earnings.

Economic theory provides contrasting insights on what results might be expected: human capital theory generally suggests that the returns on education are decreasing with age. It may therefore be better – for those individuals with high enough abilities, at least – to undergo a longer initial training, to look for a job after completing this initial training, and to train less and less as one advances in a career path. If that is true, more educated school leavers may be advantaged over participants in a training programme.

Nevertheless, the same theory also suggests that firms prefer specific rather than general human capital. One may expect that the type of human capital acquired during a training programme is more specific (to an industry if not to a firm) than the type of human capital acquired during initial training. If this assertion holds, then participants in a training programme may have an advantage over non-participants, whose education level is at best slightly higher, and who have less labour market experience.

3. The Qualifying Contract

The "Qualifying Contract" (hereafter, CQ), was created in 1984 and is addressed to individuals aged 16 to 25, who (i) either did not acquire any diploma during their schooling, or (ii) acquired a low-level diploma that does not allow them to obtain a job. The objective of the CQ is to allow youth to acquire a higher (or more "recognised") diploma through formal training. The duration of the training has to be at least 25% of the duration of the contract, which can go from 6 to 24 months.

The financial advantage for youth is that they are paid a given percentage (which can vary from 30% to 75%) of the minimum wage (the SMIC[2]), according to their age and tenure within the firm. The CQ can be signed with any employer in the *private* sector. Employers who hire a young person on a CQ benefit from an exemption of social security contributions for this particular contract.

The selection process into a CQ in 1998 was as follows: an applicant willing to participate in a CQ had to turn to the local employment agency of his area to inform them of his/her interest. Employers interested in hiring youth on a CQ did the same thing. It was then up to the local employment agencies to do the matching between youth and employers; the final decision to accept or reject an application did belong, however, to employers. Lately, the role of the agencies has been reduced. In fact, with the development of Internet, their role

[2] French acronym for "Salaire Minimum de Croissance", which could be translated as "growth-compatible minimum wage".

now mostly consists in publicising vacancies offered as CQ. It is then up to youth to apply, and to employers to decide about who they hire. This implies that any "creaming effect" that employment agencies may have had on the youth-employers matching process has been greatly reduced.

4. Econometric analysis

4.1. Propensity score matching

The methodology used in this paper is propensity score matching, which allows to give a non-parametric estimation of the effect of a "treatment[3]" (e.g. participation in a training programme) on a continuous variable (such as wages). Economic studies dealing with evaluation problems have come to rely increasingly on this methodology in the recent years. In this framework, the main problem is that of missing information. Let D be a random variable taking two values: 1 if the individual has been treated and 0 if he/she has not. Let X be a vector of observed covariates and Y be the outcome variable. In the data, we only observe Y_1 if the individual has been treated (D=1) and Y_0 if he/she has not (D=0).

Let us now concentrate on the average effect of the treatment on the treated (ATT), given by:

$$(1) \qquad \Delta^{TT} = E(Y_1 - Y_0 \mid X, D=1) = E(Y_1 \mid X, D=1) - E(Y_0 \mid X, D=1)$$

The ATT is the expected difference between Y_1 and Y_0, conditional on D=1. The missing information problem clearly concerns $E(Y_0 \mid X, D=1)$: indeed, we never observe Y_0 in the data when D=1. In other words, we never observe the wage a treated individual would have had he/she not been treated. This counterfactual will have to be estimated. In order to do so, it is common to use the information given by $E(Y_0 \mid X, D=0)$. However, the use of this information without precautions may cause biased estimations of Δ^{TT}. Hence, it is necessary to guarantee that, given X, the treated outcomes would be what the non-treated outcomes are had they not been treated. This is called the conditional independence assumption (CIA) and can be written as $Y_0 \perp\!\!\!\perp D \mid X$.

This assumption implies that selection occurs only on observables and is eliminated when accounting for X. Under the CIA, $E(Y_0 \mid X, D=1) = E(Y_0 \mid X, D=0)$ and thus we can use the latter to estimate the counterfactuals. However, as we have to condition on X, the dimensionality of the vector of covariates can limit the use of matching. Hence, another approach is normally used: following Rosenbaum and Rubin (1983), if the CIA is valid for X,

it is also valid for any given function of X, wich can be written: $Y_0 \perp\!\!\!\perp D \mid b(X)$. A very common function is the propensity score, i.e., the probability of being treated, given X: $P(X) = P(D=1 \mid X)$, because it is a one-dimensional function of X. If $P(X) < 1$, then $E(Y_0 \mid P(X), D=1) = E(Y_0 \mid P(X), D=0)$ and so the matching between treated and non-treated individuals can be done solely on the basis of their propensity scores.

When matching on propensity scores, some method has to be chosen on how to build the control group for each treated individual. Several non-parametric matching algorithms exist. In this paper, we use: (i) different nearest-neighbour estimators, which match treated observations to the *n* closest controls ($n \geq 1$), and (ii) a kernel estimator, which attributes weights to control observations according to their relative proximity to the treated observation, the relative proximity being based on the propensity scores P(X). Heckman, Ichimura and Todd (1997) have shown that evaluation bias includes the selection bias as such, the bias due to non-overlapping supports of X in the two groups and the bias due to different distributions of X within the two groups. To avoid the bias due to non-overlapping supports of X, we only consider the common support of both distributions. To avoid the bias due to different distributions of X within the two groups, we examine whether or not the average absolute standardised bias between the treatment and control groups has been reduced after matching.

4.2. Estimation strategy

We conducted our analysis in three steps. The first step consisted in estimating the propensity score. The propensity score is classically estimated using a binary qualitative-response model such as Probit or Logit. However, we face in our study a problem which cannot be tackled with these usual models: indeed, we observe the net wage in 2003 of both participants and non-participants in a CQ. However, some indivuals (both in the treatment and control groups) are unemployed in 2003, and therefore do not receive any wage. Rather than simply setting the wage to zero, we address this potential selection bias by estimating a bivariate Probit model.

We define two indicators variables y_{i1} and y_{i2}:

$$\begin{cases} y_{i1} = 1 & \text{if individual } i \text{ is employed in 2003, and 0 otherwise,} \\ y_{i2} = 1 & \text{if individual } i \text{ has participated in a CQ, and 0 otherwise} \end{cases}$$

and two latent variables y^*_{i1} and y^*_{i2} such that:

$$\begin{cases} y_{i1} = 1 & \text{if } y^*_{i1} > 0, \text{ and 0 otherwise,} \\ y_{i2} = 1 & \text{if } y^*_{i2} > 0, \text{ and 0 otherwise.} \end{cases}$$

[3] This terminology refers to the first works where this analytical framework was developed: these works where concerned with the evaluation of medical treatments.

We can then estimate the following bivariate Probit model:

$$(2) \qquad \begin{cases} y_{i1}^{*} = X_{i1}.\beta_1 + \varepsilon_{i1} \\ y_{i2}^{*} = X_{i2}.\beta_2 + \varepsilon_{i2} \end{cases}$$

where X_{ij} ($j = 1, 2$) is a vector of explanatory variables (to be defined in Section 5), β_j the associated vector of parameters, and ε_{ij} random error terms that are assumed to be jointly normally distributed, with mean 0 and correlation coefficient ρ. The main interest of this model for our purpose is that it allows us to estimate the probability the probability of having participated in a CQ, *given that* the individual is observed in employment in 2003. This is simply the conditional probability: $Pr(\text{CQ} \mid \text{employment}) = Pr(y_{i2} = 1 \mid y_{i1} = 1)$.

Once the individual propensity scores have been estimated, the second step of the analysis consists in matching them. As was said in Point 4.1., we achieved this by using two alternative non-parametric matching algorithms: (i) the n nearest-neighbour(s) estimator, implemented with three different values of n ($n = 1, 5, 10$), and (ii) the kernel estimator, using the Epanechnikov kernel function (other kernel functions were tested but all yield very similar results). We enforced a common support by dropping treated observations for which the propensity score was either higher than the maximum or less than the minimum propensity score of the control group.

Finally, the third step consisted in calculating the ATT, given by:

$$(3) \qquad \Delta^{TT} = E(w_{cq} - w_c \mid CQ = 1)$$

where w_{cq} is the average wage for the treated group, w_c the average wage for the matched control group, and where CQ=1 means that only participants in a CQ are considered.

5. Data

5.1. Presentation of the databases

The data used in this paper comes from two separate databases. The first is the so-called “Panel of Beneficiaries” of active labour market policies and vocational training 2001-2003, gathered by DARES (Direction for Statictics, Research and Studies, Ministry of Labour and Employment, Paris). It was used to build the treatment group. The second is the “Generation 1998” database, gathered by Cereq (national Centre for Research and Studies on Employment and Skills, based in Marseilles). It was used to build the control group.

The Panel of Beneficiaries is made of individuals who have participated in one of eight labour market programmes, including the CQ programme, on which we focus in this study. The data was gathered using a questionnaire survey. The database includes a five-year monthly calendar and the detailed description of five labour market situations (employment,

unemployment, inactivity…), one before participation in the programme and four after. There is information about: professional background and labour market situations prior to participation in the programme; circumstances of entry into the programme; the programme *per se* (tutoring, training, etc.). This is intended to give researchers a clearer vision of the part played by the programme in the individual's career path. The database also gives information about the socio-economic environment (type of household, financial resources, wages, etc.) and about the role played by local employment agencies in the individual's career path. Additional information on educational attainment, unemployment duration, age, etc., prior to participation in a CQ was obtained by merging the panel with administrative databases.

The population of participants in a CQ programme is made of individuals who left the programme in the fourth quarter of 1999. Given that the duration of a CQ can vary from 6 to 24 months, this means that these individuals entered the programme at one of three possible dates: in the fourth quarter of 1997 (programme duration: 24 months), in the fourth quarter of 1998 (programme duration: 12 months), or in the second quarter of 1999 (programme duration: 6 months). For this paper, we only consider those who entered the programme in 1998, in order to focus on individuals who are more comparable to the control group.

The Generation 98 database, which we used to build the control group, is a representative sample (by gender, diplomas and disciplines) of all individuals who left the French education system in 1998 and *did not go back* to schooling during that year. The data was gathered by means of telephone interviews, and there were two rounds of surveys: one in 2001 and one in 2003. The heart of the database is a monthly calendar covering the 1998-2003 period and providing information on the labour market situation of each individual (such as short-term employment, long-term employment, unemployment, inactivity), as well as on his/her wage in case of employment. The Generation 1998 database also provides a wealth of informations on individuals' schooling: type of diploma, discipline, specialization (in case of vocational training), etc. Finally, it gives socio-demographic characteristics such as age, gender, number of children, region of origin, parents' education, and parents' occupation at various moments in time.

The 55345 individuals gathered in the Generation 1998 database make an almost ideal control group for our study. Indeed, on the one hand, thanks to the "Panel of Beneficiaries", we have a treatment group made of individuals who enter a CQ in 1998, in order to get a (higher) diploma one year later. On the other hand, thanks to the "Generation 1998", we can

build a control group of individuals who left school in 1998[4] with comparable diplomas, without participating in a CQ. We will now describe in more details how these two groups were built.

5.2. Selection of the treatment and control groups

The Panel of Beneficiaries contains 1631 individuals who participated in a CQ in 1998. Among these individuals, only 1257 remained in the sample for the whole period studied. We then had to eliminate those participants who had obtained, at the end of the CQ, a vocational diploma acknowledged by employers but with no equivalent in the education system. There would indeed be no match for these individuals in the control group. We are therefore left with 860 observations for the treatment group.

As for Generation 98, we started with 55345 observations, but only 22021 individuals remain in the sample until to 2003. We eliminated individuals who reported having worked, before the end of their schooling period, in the same firm where they were working at the time of the survey. We also had to eliminate a few individuals that obtained a diploma through a labour market programme, as they would not be good controls for our purposes. This left us with 17125 observations. Finally, we eliminated individuals who obtained a diploma with no counterpart in the treatment group. In the end, there were 12289 observations left.

The control group was built in the following way: first, we calculated the distribution of diplomas among the treatment group. Second, we did a random draw among the 12289 remaining observations, using an appropriate stratification in order to replicate in the control group the distribution of diplomas observed in the treatment group. However, since the distributions of diplomas were not originally the same in both groups, this lead forced us to reduce the number of observations used from Generation 1998. In the end, our control group had a total of 2401 observations, replicating exactly the distribution of the level of diploma for the treatment group. The random draw itself was repeated a hundred times, in order to check the stability of the results when the composition of the control group varies.

The process of the selection of observations for both databases is recapitulated in Table 1, whereas Table 2 shows the distribution of diplomas in the control and treatment groups after selection. The “baccalaureat”, also known as “Bac” is a diploma that high school students receive at the end of their high school training, after passing a national exam. It is probably the most important diploma in France, as it gives access to higher education. All other diplomas are defined in reference to the Bac.

[4] And who, moreover, did not get any further training during that year.

Table 1: Selection of observations

		Treatment group (started a CQ in 1998)	Control group
Source database:		Panel of Beneficiaries	Generation 1998
All observations:		1631	55345
Keep if:	1. Remained in the sample during the whole period	1257	22021
	2.a Did *not* work, during their schooling, in the firm where they were working at the time of the survey 2.b. Did *not* obtained their diploma through an ALMP	—	17125
	3. Obtained diplomas that can be compared between the treatment and control groups	860	12289
Replication in the controls of the distribution of diplomas observed in the treatment group		—	2401
In the end		860	2401

Reading: when we keep only those that are in the sample foir the whole period, we have left 1257 observations for the CQ.

Table 2: distribution of diplomas in treatment and control groups

Diploma	**Treatment**		**Control**	
	Obs.	*%*	*Obs.*	*%*
CAP (vocational certification obtained in Junior High School)	58	6.74	162	6.75
BEP (vocational diploma obtained in Junior High School)	39	4.53	109	4.54
Baccalauréat (a.k.a. "Bac")	117	13.6	326	13.58
BTS (vocational diploma delivered in High School, 2 years after Bac)	111	12.91	310	12.91
DUT (vocational diploma delivered by Universities, 2 years after Bac)	30	3.49	84	3.5
Other training track	256	29.77	714	29.74
Dropped out before obtaining CAP or BEP	36	4.19	101	4.21
Dropped out before *Baccalauréat*	62	7.21	173	7.21
Dropped out before completion of BTS or DUT	63	7.33	176	7.33
Dropped out before completion of other training track	88	10.23	246	10.25
Total	**860**	**100**	**2401**	**100**

After selecting the treatment and control groups, we kept only variables that were observed in both groups. Most of these variables were qualitative in the treatment group, and had to be recoded in the same way in the control groups. Table 3 presents some summary statistics for the main variables used in the estimation of the propensity score and ATT. The net wage is the continuous outcome variable on which we want to measure the ATT. The

dichotomous variable "Employed" is used as the other dependent variable in the bivariate Probit estimation that we use to compute the propensity score (cf. previous section).

Table 3: summary statistics

Variable	CQ		Control group	
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*
Net monthly wage in 2003 (in euros)	1320.42	(469.44)	1215.54	(431.22)
Employed in 2003 (1 if yes, 0 otherwise)	0.87	(0.33)	0.80	(0.40)
Less than 20 years old in 1998 (1 if yes, 0 otherwise)	0.11	(0.31)	0.24	(0.43)
Gender (1 if male, 0 if female)	0.56	(0.50)	0.51	(0.50)
Initial training related to:				
- Agriculture (1 if yes, 0 otherwise)	0.05	(0.21)	0.10	(0.30)
- Manufacture (1 if yes, 0 otherwise)	0.19	(0.40)	0.17	(0.38)
- Services (1 if yes, 0 otherwise)	0.41	(0.49)	0.30	(0.46)
- Other / general (1 if yes, 0 otherwise)	0.35	(0.48)	0.43	(0.50)
Father's situation at the end of individual's initial training:				
- Unemployed (1 if yes, 0 otherwise)	0.03	(0.18)	0.03	(0.17)
- Retired (1 if yes, 0 otherwise)	0.11	(0.31)	0.07	(0.25)
Children (1 if individual has children, 0 otherwise)	0.02	(0.15)	0.02	(0.13)
Unemployment duration before 4th quarter of 1998:				
- 0 month (1 if yes, 0 otherwise)	0.94	(0.24)	0.45	(0.50)
- less than 12 months (1 if yes, 0 otherwise)	0.02	(0.15)	0.04	(0.19)
- 12 months or more (1 if yes, 0 otherwise)	0.04	(0.19)	0.51	(0.50)
Nature of benefits received at the begining of this period (if unemployed before 4th quarter of 1998):				
- unemployment benefits	0.07	(0.26)	0.03	(0.16)
- housing allowance	0.04	(0.20)	0.02	(0.15)
- family allowance	0.01	(0.10)	0.02	(0.13)
- basic income	0.01	(0.08)	0.005	(0.07)
- internship compensation	0.02	(0.14)	0.004	(0.06)
- other allowance	0.005	(0.07)	0.00	(0.00)
Number of observations	860		2401	

Reading: 11% of CQ participants are less than 20 years old.

Table 3 shows that participants in a CQ programme in 1998 tend to be older than the controls. Men are slightly more represented in the treatment group. Moreover, the initial training of participants in a CQ was more often than not vocational, with a strong orientation towards services. Most participants in the CQ programme did not experience any unemployment spell during the year when they entered the programme (which seems reasonable, due to the fact that most of them spent most of the year in the programme). By contrast, 51% of the control group experience a 12-months-long unemployment spell, which means that they were unemployed during the whole year. Given that many of these individuals left school with low-level diplomas, this is not surprising: it is quite common in France to observe a period of unemployment of one year or more starting at the end of the initial training period (see for instance Fougère *et al.*, 2000; Bonnal *et al.*, 2004). In other respects (father's occupation, children), treated individuals and controls seem quite similar.

6. Results

6.1. Estimation of the propensity score

As explained in Section 4, the first step of our analysis consisted in estimating the propensity score as the probability of having participated in a CQ (conditional on being employed in 2003) using a bivariate Probit model. The results of this estimation are presented in Table 4. The probability to be employed in 2003 is influenced by a few variables only: males have a higher probability to be employed than females. On the contrary, younger individuals, as well as those who received a general training and experienced an employment spell with family allowance in 1998, have a lower probability to be employed in 2003.

Table 4: bivariate probit estimates

Variables		**Probability of employment in 2003**		**Probability of participation in CQ**	
		Coeff.	*Std. Dev.*	*Coeff.*	*Std. Dev.*
Less than 20 years old in 1998		-0.32	(0.06)***	-0.56	(0.08)***
Male		0.29	(0.06)***	0.29	(0.06)***
Initial training related to:	*Agriculture*	0.03	(0.11)	-0.53	(0.12)***
(ref. : Services)	*Manufacture*	0.09	(0.09)	-0.25	(0.09)***
	General / Other	-0.13	(0.06)**	-0.37	(0.06)***
Unemployed father		-0.28	(0.14)*	0.18	(0.15)
Retired father		-0.08	(0.10)	0.25	(0.10)**
Children (ref.: no)	*yes*	-0.38	(0.20)*	0.42	(0.22)*
Unemployment spells in 1998	*< 12 months*	0.01	(0.15)	-0.74	(0.15)***
(ref: 0 month)	*≥ 12 months*	0.11	(0.06)*	-1.78	(0.08)***
Benefits if unemployed	*unemployment benefits*	-0.02	(0.14)	0.33	(0.12)***
(ref. : no benefits or allowance)	*housing allowance*	-0.15	(0.16)	0.03	(0.15)
	family allowance	-0.56	(0.23)**	-0.81	(0.26)***
	basic income	-0.55	(0.32)*	-0.15	(0.32)
	internship compensation	0.29	(0.32)	0.89	(0.26)***
	other allowance	-1.22	(0.64)*		
Constant		0.90	(0.06)***	-0.05	(0.05)
Correlation coefficient of error terms ρ		0.17 (0.04)***			
Log likelihood		-2847.48			
Wald test of H_0 : "$\beta_j = 0$"	Wald Chi^2: 697.05	d.f.: 31	p-value: 0.000	H_0 rejected at the 1% level	

* significant at the 10% level, ** significant at the 5% level, *** significant at the 1% level
NB: the "other allowance" binary variable was not included in the CQ equation, because it is always equal to 0 when in the control group (i.e. when CQ=0)

A large number of variables explain the probability to participate in a CQ programme: males who, in 1998, experienced an unemployment spell with either unemployment benefits or internship compensation are more likely to enter a CQ programme. This suggests that firms that propose to hire young people on a CQ select them on the basis of their previous labour market experience. Indeed, an unemployed individual cannot receive unemployment benefits if he/she has not worked for at least 2 months in a row. Similarly, receiving an internship compensation means that the individual did an internship or apprenticeship before being

unemployed. Both situations therefore indicate previous work experience, which increases the probability to be hired on a CQ.

On the contrary, younger individuals, with an initial training oriented towards anything but services, have a lower probability of being hired on a CQ. Experiencing (short or long) unemployment spells before the end of 1998 decreases the probability to participate in a CQ. Moreover, individuals who were unemployed before the end of 1998, and who received family allowances during this period of unemployment, are also less likely to participate in the programme. In a nutshell, participation in a CQ programme in 1998 seems to be mostly conditioned on previous labour market situations, and more precisely on unemployment and previous work experience.

6.2. Estimation of the ATT

After computing the propensity score, we proceeded with propensity score matching and estimated the ATT, as explained in Section 4. The results of the estimation of the ATT are given in Table 5, which presents the value of the ATT before matching (i.e. the difference between the average wage for both groups), and for each of the matching algorithms that we implemented. The unmatched estimator shows a strongly significant positive difference between the treatment and control groups, in favour of the treated. After matching, this positive difference remains significant in 3 cases out of 4: only with the simple nearest neighbour matching estimator does the difference between treated and controls become non-significant. According to the other three estimators (5-nearest neighbours, 10-nearest neighbours, and Epanechnikov kernel), participation in a CQ programme yields a significant wage premium 5 years later. The magnitude of this premium varies from roughly 79 euros (according to the kernel estimator) to 204 euros (according to the 5-nearest neighbour estimator).

Table 5: estimation of ATT based on propensity scores matching

Method	**ATT on net wage in 2003**		
	ATT estimate	*Standard Deviation*	*Student T*
Before matching (unmatched)	103.48***	(20.74)	4.99
Nearest neighbour	128.04	121.48	1.05
5 nearest neighbours	204.08***	58.36	3.50
10 nearest neighbours	95.65**	45.64	2.10
Kernel	78.69***	(25.20)	3.12

* significant at the 10% level, ** significant at the 5% level, *** significant at the 1% level

Before commenting on these results, it is necessary to examine the performance of the estimation. First, we observed that, whatever the matching method we used, there were

always 99.8% of the treated individuals on support (i.e. matched to corresponding individuals in the control group on the basis of their propensity scores). Therefore, we should not fear biases arising from non-overlapping supports of observables in the treatment and control groups.

Second, we tried to assess the performance of each match by examining the reduction of the average absolute standardised bias, before and after matching. The average absolute standardised bias is formally defined as the difference between sample means in the treatment and control groups as a percentage of the square root of the average of the sample variances in both groups. Table 6 shows that each estimator performed rather well, as there has been a reduction in bias after matching – which means that we are comparing distributions that are more similar after matching than before.

Although there is no benchmarking for this bias, comparing these values to those obtained in other studies (e.g. Bryson *et al.* 2002; Vandenberghe and Robin, 2004) suggests a performance of the match. The simple nearest neighbour and the Epanechnikov kernel estimators seem to have performed better than the other estimators. Overall, we should not fear biases arising from different distributions of observables in both groups.

Table 6: Performance of match (reduction of average absolute standardised bias)

Methods	**Average absolute standardised bias**		**% reduced bias**
	Before matching	*After matching*	
Nearest neighbour	19.71	2.57	87.0
5 nearest neighbours	19.71	3.19	83.8
10 nearest neighbours	19.71	3.89	80.3
Kernel	19.71	2.87	85.4

Finally, estimations performed with other randomly-drawn control groups (as explained in Section 5) have yielded results that are very similar to those presented here. Overall, the effects of participation in a CQ programme on earnings thus seem consistent and stable[5]. The reader should keep in mind that we observe individuals who entered this programme in 1998 with a certain education level, and got a higher education level at the end of the programme, in 1999. These participants are compared to individuals who left school in 1998 with education levels similar to those obtained by the participants at the end of the CQ. Our results therefore suggest that participants who enrol in a CQ programme can expect, 5

[5] Alternatively, we estimated the propensity score using a simple Probit to estimate the probability of participation in a CQ, and setting the wage to zero for unemployed individuals in 2003. This more conservative methodology yielded similar results: all matching estimators showed a significantly positive ATT. The only difference with this approach was, unsurprinsgly, that the unmateched estimator was negative.

years later, significantly higher wages, compared to individuals who left school with a similar level of education.

From a theoretical perspective, this may suggest that firms reward human capital acquired during on-the-job-training more than human capital acquired during initial schooling. This may be because the former is more specific (maybe not to a given firm, but at least to an industry) than the latter. Moreover, from the firm viewpoint, the CQ training programme may be seen not only as a period of human capital acquisition by the trainee, but also as a trial period, as in job-matching theory: at the end of this period (which can last from 6 to 24 months), the firm can decide either to break the match or to make more permanent (by hiring the trainee on a more conventional labour contract, for instance).

In a more empirical perspective, our results may give some insight in the type of education valued by firms: it seem indeed that, if education matters, it matters more when combined with some degree of labour market experience. Firms prefer to hire young persons with a lower education level (but some degree of labour market experience) and train them themselves, than to hire inexperienced youth with a slightly higher education level.

7. Conclusion

The objective of this paper was to evaluate the impact of the "Qualifying Contract" on earnings. The Qualifying Contract is a training programme for youth widely used in France. Its purpose is to allow youth to acquire additional labour market experience and education, and to validate this experience and education by granting a formal diploma (equivalent to those that can be obtained through initial schooling). The participant therefore "qualifies for" a formal diploma (hence the denomination of the contract). However, this diploma may or may not have the same effect on post-training wages as a similar diploma acquired through initial schooling.

In order to answer this question, we observe the 2003 net wages of a group of participants enrolled in a Qualifying Contract in 1998 (the "treatment" group). Using propensity score matching, we contrast these wages to the 2003 net wages of a control group made of individuals who completed their initial training in 1998 with diplomas similar to those obtained by the treated *at the end of the programme*. In order to control for selection biases arising from the fact that some individuals (participants and non-participants alike) may be unemployed in 2003, we estimated the propensity score using a bivariate Probit model.

We estimated the average effect of the treatment on the treated using various non-parametric matching algorithms. All algorithms but one (the simple nearest neighbour) show a significantly positive effect of the treatment on the treated. In other words, participants in

the programme benefit, five years after participation, from a positive wage premium going from 80 to 200 euros (depending on which estimator is used). This suggests that firms do not simply value education: if education matters, then it matters even more when it is coupled with practical labour market experience.

References

Bonnal, L., D. Clément, S. Mendès (2004) "L'accès au premier emploi au cours des années 1990 : le cas des apprentis et des lycéens", Economie et Statistique, n° 378-379, pp. 35-53.

Bryson, A., Dorsett, R., Purdon, S. (2002): "The use of propensity score matching in the evaluation of active labour market policies", Working Paper n°4, Policy Studies Institute, London.

Fougère, D., Kramarz, F., Magnac, T. (2000): "Youth employment policies in France", *European Economic Review*, vol. 44, n.° 4-6, pp: 928-942.

Gautié, J. (1996): "L'évaluation de la politique de l'emploi en faveur des jeunes en France", *Dossier du Centre D'Études de L'Emploi*, n.° 8, pp: 1-145.

Hämäläinen, K., Ollikainen, V. (2004): "Differential effects of active labour market programmes in th early stages of young people's unemployment", VATT Research Report n.° 115, Government Institute for Economic Research (VATT), Helsinki.

Heckman, J. (1979): "Sample selection bias as a specification error", *Econometrica*, vol. 47, n° 1, pp: 153-161.

Heckman, J., Ichimura, H., Todd, P. (1998): "Matching as an econometric evaluation estimator", *Review of Economic Studies*, vol. 65, n.° 2, pp: 261-294.

Heckman, J., Ichimura, H., Todd, P. (1997): "Matching as an econometric evaluation estimator: Evidence from evaluating a job training program", *Review of Economic Studies*, vol. 64, n.° 4, pp: 605-654.

Heckman, J., Ichimura, H., Smith, J., Todd, P. (1998): "Characterizing selection bias using experimental data", *Econometrica*, vol. 66, n.° 5, pp: 1017-1098.

Heckman, J., LaLonde, R., Smith, J. (1999): "The economics and econometrics of active labor market programs", in *Handbook of Labor Economics Volume 3A,* Ashenfelter and Card eds, Amsterdam: North Holland, 1999, pp: 1865-2097.

Larsson, L. (2003): "Evaluation of Swedish youth labour market programmes", *Journal of Human Resources*, vol. 38, n° 4, pp: 891-927.

Lechner, M. (1999): "Identification and estimation of causal effects of multiple treatments under the conditional independence assumption", in *Econometric Evaluations of Labour*

Market Policies, M. Lechner and F. Pfeiffer eds, Heidelberg: Physica Verlag, 1999, pp: 43-58.

Raaum, O., Torp, H., Zhang, T. (2002): "Do individual programme effects exceed the costs? Norwegian evidence on long run effects of labour market training", Memorandum 15/2002, Department of Economics, University of Oslo.

Robin, S., Vandenberghe, V. (2004): "Evaluating the effectiveness of private education across countries: a comparison of methods", *Labour Economics*, vol. 11, n.° 4, pp: 487-506.

Rosenbaum, P., Rubin, D. (1983): "The central role of the propensity score in observational studies of causal effects", *Biometrica*, vol. 70, pp: 41-55.

Rubin, D. (1977): "Assignment to treatment group on the basis of a covariate", *Journal of Educational Statistics*, vol. 2, n.° 1, pp: 1-26.

Smith, J. (2000):"A critical survey of empirical methods for evaluating active labor market policies", *Swiss Journal for Economics and Statistics*, vol. 136, n.° 3, pp: 1-22.

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