Is there a Trap with Low Employment and Low Training for Older Workers in France ?

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Is there a Trap with Low Employment and Low Training for Older Workers in France ?

Luc Behaghel

Abstract

The risk of a trap with low training and low employment is a powerful argument for policies to foster lifelong training. France is sometimes said to be fallen in such a trap after the surge in early retirement at the beginning of the 80s built the expectation that older workers, likely to leave the workforce early, were not worth training.

We model and test the idea of the trap, and surprisingly find little evidence of such a mechanism over the 80s, as the relative access of older workers to firm-provided training does not seem to decrease. Moreover, access to training has considerably risen between 1985 and 1993, at all ages. These two results hold when controlling for changes in key variables that affect training (diploma, job position, firm size, industry).

We conclude that the trap due to early retirement prospects, if it existed, was not a major driver of training decisions and was largely dominated by other factors that pushed for training at all ages. One such factor could be the accelerated obsolescence of initial training, linked to technological change. As for the small magnitude of the trap, we interpret it as evidence that the payback period for training investment is too short for retirement expectations to influence training decisions before age 50-55.

Keywords: Training, older workers, human capital.

Existe-t-il un piège à faible emploi et faible formation pour les salariés âgés en France ?

Résumé

Le risque d'un piège à faible emploi et faible formation constitue un argument majeur en faveur des politiques de formation tout au long de la vie. La France serait tombée dans un tel piège dans les années 80 avec le développement des préretraites : ces dernières auraient validé l'idée qu'en raison des cessations d'activité précoce, la formation des salariés âgés ne se justifie pas.

L'idée du piège est modélisée et testée empiriquement. De façon surprenante, le piège ne semble guère avoir fonctionné dans les années 80 : l'accès relatif des salariés âgés à la formation continue ne paraît pas décliner. En outre, l'accès à la formation continue s'est nettement accru à tout âge entre 1985 et 1993. Ces deux résultats sont robustes à la prise en compte de changements de structure affectant les niveaux de diplôme, les catégories socioprofessionnelles, la taille des entreprises ou la composition sectorielle de l'économie.

En conclusion, le piège, si piège il y eut, fut de faible ampleur, largement dominé par d'autres facteurs qui ont poussé à un effort de formation accru. L'un de ces facteurs pourrait être l'accélération de l'obsolescence de la formation initiale, en lien avec le progrès technique. Quant à la faible ampleur du piège, elle peut s'interpréter comme le signe que *l'horizon des décisions de formation, relativement court, n'est influencé que de façon marginale par les perspectives de cessation d'activité.*

Mots-clés : *Formation continue, salariés âgés, capital humain, cessations anticipées d'activité.*

JEL classification: J14 ; J24 ; J26

1 INTRODUCTION

Lifelong training comes naturally enough with the objective of maintaining older workers in employment. Is it possible to go a step further and to see unequal access to firm-provided training as one of the causes of the low employment of older workers in France? This is the hypothesis we want to test here.

The idea of a trap with low employment and low training for older workers is often present, more or less formally, in the economic literature (see in particular [16], [9], [15]). Pisani-Ferry phrases it nicely as the risk of a self-fulfilling prophecy: "The very existence [of pre-retirement schemes] leads firms to reduce training for workers at the end of their career, which in turn validates *ex post* the opinion that their productivity has become too low to justify that they remain employed".

Clearly, the theory is appealing: it helps explain the observed persistence of the low employment of older workers, or the difficulties to phase out pre-retirement schemes, although effort in that direction has started in ... 1983. Employment rates after 55 did not recover (see figure 1); instead, as conditions for state-funded pre-retirement became more and more stringent in the 90s, large numbers of older workers who were still leaving employment early had to rely upon unemployment benefits before reaching the legal age for retirement. The theory is also consistent with the consensual theme of lifelong training, rooted in the view that training, like education, is both a right and a necessity that should suffer no discrimination. Last but not least, it has clear policy implications: if there is a trap that leads to underinvestment in human capital of older workers, the state must intervene to reverse expectations of early retirement and to subsidize training that has positive social externalities (as it will enable the society to get rid of costly pre-retirement schemes)[1].

So why should we question the idea of the trap?

There is first a need to check the practical relevance of the trap: what are the theoretical conditions for the trap to matter? Are they validated empirically? To be relevant for policy, the trap must be more than a simple simultaneity of training and employment decisions. There is truly a trap if training and employment are interrelated but sequential decisions, so that training decisions that appear wrong *ex post* get you locked in. Typically, one has in mind firms that would not train their workers after age 45, because they expect their withdrawal from the workforce at age 56; they may revise their expectations when the worker is 50, but it is too late, and the worker is laid off when 56. There is therefore a crucial assumption: the required payback period for investing in training must be long enough for *long-term* employment perspectives to drive training and future employability. If the firm just stops training the worker at 54 for retirement at 56, the practical relevance of the trap is lower.

Second, assessing the magnitude of the trap is necessary to set priorities. Indeed, fashionable policy targets like lifelong training are always at risk of hiding more important problems. Other possibly more important sources of the low employment rates of older workers should not be forgotten: these include the role of specific employment protection for older workers ("contribution Delalande") that could have deterrent effects on the hiring of older workers, or the breach in long-term contracts between employers and employees, leading to dismissals of older workers who were paid above their marginal productivity in the old equilibrium (see for the United States [17], [10]). Each explanation needs to be empirically assigned its true value, if policies are to be rightly directed.

[1] The argument is close to those underpinning affirmative action: since firms have no incentive to check that older workers can remain productive when trained, let us force them (or at least give them incentives through subsidies) to try. They will realize it is worth the investment and keep doing it in a new equilibrium.

How does the question of the trap, and more globally of underinvestment in training, relate to the economic literature?

A first branch of applied literature on training ([16], [9], [15]) informally develops the idea of the trap and takes inequality of access to training across ages as evidence for it. OECD uses international comparisons in which France is above average for the ratio of participation rates to training of age class 25-29 over age class 50-54. However, due to limited reliability of the data, [3] follows an alternative strategy, looking at the evolution of relative access to training in France, with homogeneous time series from the FQP (Formation et qualification professionnelle) survey[2]. He concludes that the access of older workers to training seems to have rather *improved* in France.

A second branch of applied literature is concerned with measuring the returns on training and hardly finds any. That literature builds on Becker's seminal distinction between general and specific human capital [4], and looks for the wage increases predicted by the theory when training is general. Results are often disturbing: on the same FQP data as we use, Fougère, Goux and Maurin (see [7], [11]) show that, once selection effects are taken into account, firm-provided training has no significant effects on wages.

On the other hand, the absence of wage effects of training does not mean that there is no productive effect of that training, even if it is general. Here comes a third and up-to-now mostly theoretical branch of the literature, developed by Acemoglu and Pischke ([1]): though "technically" general, training might be "economically" specific in the sense that, due to imperfect labor markets, the employer is able to capture the return. General training might have productive effects that benefit mostly (or only) to the employer. This theory explains why employers usually finance most of the training, though Becker's distinction would have the employee finance the general training. But a likely consequence is that there is no unique residual claimant to the investment, so that training decisions might be suboptimal (underinvestment).

To summarize, the existing literature leaves us with a clear but informal intuition of a trap with low employment and low training for older workers, and with a debate on what the returns on training are, and who captures them. Our paper mostly aims at explicating and testing the first intuition. At the same time, we will obviously come across the questions raised by the second branch of the literature: what is the nature of the return on training? It will be a key assumption of our model that training increases productivity. But we will remain "agnostic" on the way the return is split between the employer and the employee, as we will not need to explicit it. We get back to that question in section 5.

The paper is organized as follows. In section 2, in a simple model, we derive the optimal responses of training decisions to government-subsidized pre-retirement. In section 3, we run a test of the theory: has the relative access of older workers to firm-provided training decreased over the 1980s? Section 4 introduces the obsolescence of initial training (education) as a plausible lever for increased demand for training at all ages, and discusses the previous tests under that light. Section 5 interprets the results. Section 6 concludes and lists some further research areas.

The main results can be briefly summarized. The theoretical case for the trap is quite compelling, as pre-retirement schemes reduce the return on training for all workers, and more dramatically so for older than for younger ones. A first implication of the model is validated by the data: in 1977, 1985 and 1993, access to firm-provided training significantly declines at the end of careers. But the second and main implication of the model is not supported by the

[2] Our work uses the same data and therefore follows up on his work. We add more systematic controls for factors that drive the access to training and interpret the evidence with regard to human capital theory and to the idea of the trap.

data: the relative access of older workers to firm-provided training has not decreased at all between 1977 and 1985, nor really between 1985 and 1993. Moreover, between 1985 and 1993, access to training has considerably increased at all ages. All results are robust to controlling for various factors that affect investment in training: industry, firm size, job position, diploma,.... Hypotheses are needed on why training has increased at all ages, as this major change certainly has impact on the relative access to training across ages. One such hypothesis is provided with the accelerated obsolescence of initial training. We argue that this can have effects on the relative access to training that we do not measure, and that it makes it hard to rely upon the 1985-1993 period to identify possible effects of a trap. But we see no evidence for the trap between 1977 and 1985, were it should be apparent. Our reading of the evidence is that the trap, if any, had small effects; this is consistent with the view that training decisions are taken for a relatively short payback period. Too pessimistic views of the access of older workers to training might thus need to be revised.

2 A MODEL OF THE TRAP WITH LOW EMPLOYMENT AND LOW TRAINING

Let us give the intuition of the model. We want to see how the rise of pre-retirement schemes can activate the trap. To that end,

1. We first show that, at equilibrium, the optimal profile of training is decreasing at the end of the career. This is mostly due to the fact that training is less attractive for older workers, as it is amortized on a shorter period. (A second reason, often given, lies in the lower opportunity cost of time spent in training by younger workers, as they have not reached their maximum productivity yet.)

2. We then show that the risk of an early ending of the job comes to reduce the investment in training at all ages, but to a stronger extent at older age. Indeed, the shortening of the horizon of return is proportionally more important for older workers.

3. Two changes are likely to increase the risk of an earlier ending of the job: a rise in the reservation wage at the end of the career, or a loss in productivity at the end of the career. We detail the former: the rise in the reservation wage can come from a policy supporting (and financing) pre-retirement.

4. In turn, the lower training at older age reduces future employment chances. A new equilibrium is reached with lower training and lower employment: the trap is closed.

2.1 Assumptions

Our model solves for the optimal training profile along the career of a representative employee. We consider the second half of the career, divided into three periods (period 1: "medium-age worker"; period 2: "older worker"; period 3: "old worker"). The employee produces at all periods, and takes training at periods 1 and 2, with effect on the following periods. The problem takes place within the usual framework of investment decision under uncertainty. There are however four specific assumptions we need to stress:

1. The optimal level of training is decided jointly by the employer and the employee ("cooperative game"). We do not specify the impact of the training on the wage: what matters

is the impact on the surplus created by the job, and training is chosen to maximize that surplus. This way of stating the problem is consistent with several ways of determining wages, for example with Nash negotiations where each party gets a constant fraction of the surplus and is thus induced to maximize that surplus. But one can obviously think of different wage settings that would lead to different training decisions. Our point is that these settings would be sub-optimal, and that this would need to be justified. This is not our goal in our model, which rather deals with (optimal) responses of the training profile to changes in the environment.

2. We do not assume turnover before period 3, at which there is possible exit toward non-employment. This is obviously an important simplification. It puts aside the discussion on specific vs. general training: everything happens as if all training were specific, since there will not be any other job for the same worker. The advantage is that it focuses us on the type of mobility we are interested in: mobility out of employment at old age. And for the risk of that mobility to be real, we will assume sufficient variance of the productive shocks in period 3, so that there is always a fraction of old workers unemployed.

3. We view the reservation wage as exogenous, and independent, in particular, from the level of training received. This largely stems from assumption 2: the training cannot be used nor valued in another firm, so it becomes irrelevant for the reservation wage, which is merely driven by pension or unemployment benefits. Even so, there is an assumption in considering these benefits as independent from training: this does not hold if the benefits are linked to past wages while training has an impact on wages.

4. Last but not least, we assume that training has a positive impact on the surplus (no matter how the surplus is split afterwards). We have seen from the literature that this question is open. We would argue that, as of today, we lack explanation of why firms would spend money in training (as they do, and well beyond the legal minimum, as noticed in [11]) if it has no effect on productivity.

Let us call T_1 and T_2 the level of training chosen for period 1 and 2. It follows from the assumptions that T_1 and T_2 are chosen to maximize the expected surplus created by the job over its two- or three-period duration. To further explicit that surplus, we introduce the following additional assumptions or notations:

Let us call π_3 the (marginal) productivity of the employee at period 3.

$$\pi_3 = (1 - \delta) \times T_1 + T_2 + \epsilon \tag{1}$$

where:

ϵ is a productivity shock occurring at the beginning of period 3 and following a uniform distribution between $-k$ and k. The variance of the shock (hence, k) is assumed to be large enough so that there are always some jobs that are ended at the beginning of period 3. The shock can come from various causes: demand to the firm, changes in technology, individual productivity shock on the worker,...

δ is the rate of depreciation in the effect of training.

Other notations include WR_2 and WR_3, the reservation wages; β, equal to 1 minus the discounting factor, and C, the cost function to training. We assume $C'' > 0$ (increasing marginal costs to training).

2.2 Initial equilibrium and optimal age profile of training

We first write the expected surplus from the job as a function of T_1 and T_2 :

$$S_3 = \frac{k - WR_3 + ((1-\delta)T_1 + T_2)}{2k} \times \frac{(1-\delta)T_1 + T_2 + k - WR_3}{2} \tag{2}$$

The first term of the product is the probability that the job is maintained at period 3, i.e. the probability that $\pi_3 \geq WR_3$. The fact that it is always strictly between 0 and 1 is ensured by the assumption that the variance of shocks (hence, k) is sufficiently large. The second term of the product is the expectation of the surplus, conditional on it to be positive. As the distribution is uniform, it is simply the average between 0 and the maximum surplus, $(1-\delta)T_1 + T_2 + k - WR_3$.

We can rewrite:

$$S_3 = \frac{1}{4k} \times ((1-\delta)T_1 + T_2 + k - WR_3)^2 \tag{3}$$

The overall surplus to maximize is:

$$S = -C(T_1) - WR_1 + \beta(T_1 - WR_2 - C(T_2)) + \frac{\beta^2}{4k}((1-\delta)T_1 + T_2 + k - WR_3)^2 \tag{4}$$

First-order conditions implicitly define T_1 and T_2 :

$$C'(T_2) = \beta\frac{(1-\delta)T_1 + T_2 + k - WR_3}{2k} \tag{5}$$

$$C'(T_1) = \beta + \beta^2(1-\delta)\frac{(1-\delta)T_1 + T_2 + k - WR_3}{2k} \tag{6}$$

Since $0 < \frac{(1-\delta)\times T_1 + T_2 + k - WR_3}{2k} < 1$ (again, due to sufficient variance in shocks, the risk of unemployment is real), the model has two implications:

1. *The level of training chosen is lower than if there were no risk of unemployment.* (In that case, one would choose T_1' and T_2' so that $C'(T_2') = \beta$ (which is greater than $C'(T_2)$) and $C'(T_1') = \beta + \beta^2$ (which is greater than $C'(T_1)$). As C' is increasing, we get $T_1 < T_1'$ and $T_2 < T_2'$).

2. *The training profile decreases with age.* (We see that $C'(T_2) < C'(T_1)$, for two reasons: (i) T_2 is amortized over two periods, T_1 only one; (ii) once discounted, the risk of unemployment weighs more heavily on T_2 than on T_1, since it takes place immediately after.)

Let us now consider how this equilibrium is modified when the environment changes.

2.3 Impact of an employment policy subsidizing early retirement

Intuitively, subsidizing pre-retirement makes it more attractive to break the employment relationship for both parties. This increases the probability that the training effort incurred in the previous period be lost. However, the disincentive effect that results is lower when the employee is younger, as one has to take into account that one part of the training will have been amortized before. We thus expect that the employment policy subsidizing early retirement will result in a fall of both T_1 and T_2, but with bigger impact on T_2.

In the model, the policy can be interpreted as an exogenous rise in WR_3, since it improves the exit option at the end of the career. The effect is derived by differentiating the first-order conditions with respect to WR_3, T_1 and T_2. We notice that $K = \beta \times \frac{(1-\delta)\times T_1 + T_2 + k - WR_3}{2k}$ appears in the two equations and get:

$$-C''(T_1).dT_1 + \beta(1-\delta).dK = 0 \tag{7}$$

$$-C''(T_2).dT_2 + dK = 0 \tag{8}$$

This implies that dT_1 et dT_2 have the same (negative) sign, and, eliminating dK between the two equations:

$$\frac{dT_1/dWR_3}{dT_2/dWR_3} = \beta(1-\delta) \times \frac{C''(T_1)}{C''(T_2)} \tag{9}$$

According to the exact shape of C, we can have $\frac{C''(T_1)}{C''(T_2)}$ greater or smaller than 1. If it is greater than 1, one can reasonably assume that since β and $(1-\delta)$ are clearly below 1 (each period being quite long, say 5 to 10 years, the actualization and depreciation has a large impact), so that eventually $\frac{dT_1/dWR_3}{dT_2/dWR_3} < 1$.

To summarize, more attractive exit options for older workers lead to a decrease in the access of older workers to training, in two ways: (i) at all ages, training is lower; (ii) the decrease is maximum for older workers.

2.4 Employment consequences for older workers

To close the model in term of employment, remember that the probability to remain employed in period 3 is:

$$P = \frac{k - WR_3 + (1-\delta)T_1 + T_2}{2k} \tag{10}$$

Thus, the changes on T_1, T_2 and WR_3 that we have worked out all contribute to reduce P and to increase unemployment of older workers. Relative accesses to employment and to training have both decreased.

Let us conclude the model with a last remark. Up to now, we have considered perfect information (except for the productivity shocks). But at the time of investing in training, there is also uncertainty on WR_3: how will subsidies to early retirement evolve? If agents expect them to be maintained, then T_1 and T_2 will be chosen at their low level. If they are eventually stopped, it is too late: some workers have been trained at a sub-optimal, low level, and they will lose their job. Wrong expectations on subsidies to pre-retirement are enough to generate unemployment. As [16] writes, a change in policy must be accompanied by a good management of agents' expectations, in order to be efficient. Credibility of the policy would be a key to success.

3 A SIMPLE EMPIRICAL TEST

The prediction we want to test is twofold: (i) at equilibrium, investment in firm-provided training is lower at the end of careers; (ii) the relative investment for training of older workers has decreased over time.

Let us sketch the main results:

1. Over the 1980s, the first striking fact is the overall rise in access to firm-provided training (multiplied by more than 2 at all ages).[3] This rise occurs mostly between 1985 and 1993 and remains even after controlling for a variety of factors.

2. Between 1977 and 1985, the profile of access to training has remained remarkably stable; there is no evidence of decrease in the relative access of older workers.

3. Between 1985 and 1993, the evolution of the relative access of older workers to training is harder to assess, as levels have considerably changed. However, with a variety of metrics, the relative access of older workers to training does not seem to have significantly decreased, at least before age 50 in the manufacturing sector, and before age 55 in the service sector.

4. Focusing on particular categories (different job positions, for instance the unskilled manufacturing workers) does not modify the picture: among them, the access of older workers to training has not decreased, and access to training has improved at all ages.

5. Focusing upon large firms (more than 500 employees) in the manufacturing sector, where pre-retirement schemes have been most widely used, results go slightly more in the predicted direction: relative access of older workers has not improved and might have very slightly decreased between 1985 and 1993.

   Overall, evidence for the trap is weak, and relative changes are second order ones when compared to the rise of training that benefited all age categories.

3.1 Approach and data

To make the predictions of the model operational, we need to specify three things:

- at what points in time do we expect the change to occur?
- how do we measure investment in training?
- how do we define the relevant categories related to the model (in particular, "medium-age workers" and "older workers")?

3.1.1 Choice of periods

The period for the surge in early retirement is quite easy to define: the rise in pre-retirement mostly occurred at the beginning of the 1980s and stabilized later on. By 1984, 694 000 workers were in pre-retirement in France, after a rapid increase (see in particular [5]). One might argue, though, that it is only the access to pre-retirement that changed over the period, and that most of the effect on employment rates came from the change in the legal age for retirement (brought back from 65 to 60 in 1982).That is not the case: if one looks at historical series back from 1970, there is a continuous trend of decrease in participation of the 60-64 to the labor force (see figure 1). There is no drop around 1982. Hence, the payback period for training has decreased gradually over the past years, with an acceleration at the beginning of the 80s that

[3]The point is noticed by Goux and Maurin [11] although their contribution focuses upon the 1993 survey. Publications by CEREQ illustrate the same point. Gauron [9] insists on the increased spending on firm-provided training.

can be linked to preretirement schemes. We therefore test the correlation between this decrease in the payback horizon (at least partly due to institutional changes like preretirement schemes) and the investment in training.

As comparable FQP data are available for 1977, 1985 and 1993, and employment rates continued falling after 1985, it is interesting to test the trap on both sub-periods.

3.1.2 Measure of investment in firm-provided training: the FQP data

The FQP survey (enquête sur la Formation et la qualification professionnelle) is an individual worker survey that enables us to compare access to firm-provided training across time, with a variety of covariates. In spite of big changes in other questions over time, we can compute the probability, in 1977, 1985 and 1993, to have benefited from a training, financed by the employer, over the five previous years. The way that particular information is asked for is strictly the same in 1977 and 1985, but differs in 1993. Nonetheless, the definitions remain the same and there is no apparent reason why the difference in phrasing would bias the answers in one way or the other.

There are other questions about the nature and the duration of the training. Unfortunately, these are not comparable across time. We will only use the question on duration for a rough check.

3.1.3 Age categories

We will divide the workforce into 5-year age categories. This will enable us to draw smooth enough age profiles of access to training. However, when computed year by year, age profiles are not that smooth and make it clear that statistical results are sensitive to the age cuts chosen (see figure 2).

However, to test the predictions of the model statistically, we need to specify who our "period 1", "period 2" and "period 3" workers are. We have tried different solutions, with slightly different results, but the same overall conclusion. Here are the cuts we make. Period 3 (when the worker roughly does not receive any training and often quits his job) will be above 60 (beware that our access variable is defined for the previous 5 years: so this goes back to age 55 at the beginning of the period). There is a "period 0" for the beginning of the career that the model did not cover: from age 20 to 34. The decisive cut is between "medium-age workers" and "older workers" (periods 1 and 2). We define the former as those aged 35 to 44 at the date of the survey, and the latter as those aged 50 to 59 (we set aside the intermediary age category 45 to 49).

3.2 Descriptive statistics and gross access to training

The sample includes all wage-earners in the private sector from 1972 to 1977, 1980 to 1985 and 1988 to 1993. Descriptive statistics are given in the appendix. Figure 3 plots the (gross) access to training by 5-year age categories.

Whatever the age, access to training has increased between 1977-1985 and 1993. It is hard to judge whether it is more or less balanced across ages in 1977 or in 1993.

Before getting to a statistical model that controls for the impact of other factors, let us look at the question of measurement: maybe the access is too partial a measure for investment in training. For example, in a context where access to training has increased for all, it might be that employers have given older workers access to training to avoid to discourage them, but that these are very short, insignificant training periods. Unfortunately, as noticed above, the data on the duration of training cannot be readily compared in 1977 and 1993. In 1977, the question asked to describe "the longest or most important training period ever received", while in 1993, it concerned the last period. Therefore, results on duration will bias the average training of older workers (over their all career) upward in 1977 as compared to 1993. Let us pursue the comparison, though. We create the average quantity of training received by using the data on duration (in hours), setting 0 in the absence of training. Figure 4 displays the (not directly comparable) profiles.

Actually, profiles are not very smooth: estimates are not very reliable, with large confidence intervals. Nonetheless, this tends to show that, in terms of hours of training and in spite of the unfavorable bias, the relative position of older workers does not seem to worsen between 1977 and 1993.

3.3 Participation to training and test of the hypothesis:

We estimate the following probit model, standard for the access to firm-provided training (see [11]).

$$\Pr(Training) = \Phi(c + \alpha_{85} + \alpha_{93} + \sum_t \sum_{1\leq j\leq 9} \beta_{jt} 1_{agej} 1_t + \sum_t \sum_{1\leq j\leq 11} \gamma_{jt} 1_{industryj} 1_t$$
$$+ \sum_t \sum_{1\leq j\leq 4} \delta_{jt} 1_{positionj} 1_t + \sum_t \sum_{1\leq j\leq 3} \eta_{jt} 1_{firmsizej} 1_t + \sum_t \sum_{1\leq j\leq 4} \zeta_{jt} 1_{diploma} 1_t$$
$$+ \sum_t \mu_t 1_{parttime} 1_t + \sum_t \nu_t 1_{man} 1_t)$$

The controls (job position, industry, firm size, diploma, part-time work and gender) are introduced as dummy variables and systematically interacted with year dummies. These interactions allow for changes in the behavior toward the various factors determining investment in training. A specification without these interactions has been statistically rejected.

Table 1 gives detailed results of the probit model. Though our focus is on the age coefficients, let us briefly comment upon the other coefficients, that are consistent with other similar work ([11]). Large firms, industries like energy and finance, are characterized by more training. To a lower extent, individual characteristics are significative, like initial training (higher diploma leads to more training) or job positions.

Coefficients and standard errors for the age dummies (5-year categories) are also given in table 1[4], and figure 5 draws the corresponding predicted profiles (controls are set to their sample means for 1977 and 1993).

We now want to test statistically the prediction that relative access of older workers to training has decreased. We have already discussed the choice of the age categories. Another choice is not obvious: shall we define relative access as a difference or a ratio? As a look at the graph indicates, this has important consequences for the 1977-1993 comparison since the levels in 1977 and 1993 are so different. A way to decide is to look at the prediction of the model: it suggests to look at differences, since it states $\frac{dT_1}{dT_2} < 1$. However, the model does not include a rise in levels of training. What are the consequences of that rise on relative access to training, to sort it out from the possible effects of the trap? Figure 6 depicts what would happen if marginal returns on training were multiplied by a same factor at all ages, with constant derivatives of marginal costs and marginal returns. Clearly, the overall increase in training would be associated with a change in the difference between T_1 and T_2. Therefore, our basic model is not robust to these changes (we consider a more complete model in section 4) and it is not a sufficient argument for one metric or another.

[4] With large standard errors, estimates are not very accurate. This is in part due to the relatively small age categories considered. For statistical tests, we get more power by further grouping of the ages.

Our preferred metric is the ratio, as we think that comparing differences is misleading when there has been such a change in the average level of access between the two periods[5]. It is also the kind of metric used for international comparisons of relative access according to age (see [15]). As this choice is arguable, table 2 gives the alternative metrics. Given that we used a non-linear probability model, the equations to test involve quite complicated non-linear combinations of the model's coefficients. We therefore performed non-linear Wald tests.

Overall, we conclude that there is no significative decrease in the relative access to training of older workers. Between 1977 and 1985, relative access is remained stable. Between 1985 and 1993, as expected from the graphics, results depend on the chosen metric. However, even with differences, the decrease in relative access for older workers is rather small (4 points of percentage) and hardly significant.

3.4 Selection bias issues

One could argue that our negative results are driven by selection biases, because our sample excludes workers that changed employer over the five year period (1972-77, 1980-85 or 1988-1993) and workers that were not employed at the survey date. If the structure of mobility has changed between the two periods, then the results are impacted.

Selection issues are difficult to solve. We would need to model the mobility between jobs and out of employment. But, given endogeneity, the estimation of such models would require valid instruments that explain mobility and not participation to training. In the case of mobility to non-employment, these instruments seem particularly hard to find, as we have seen that training decisions are directly affected by anticipations of non-employment. The same is true for mobility toward other jobs. Fougère, Goux and Maurin [7] deal with such a model of multiple selection, using additional firm data as instruments. Here, we will restrict ourselves to checking indirectly to what extent the bias is likely to change our conclusions.

Let us take mobility toward other firms first. One informal way to check whether restricting ourselves to mobile workers changes the net age profiles (controlling for participation factors other than age) is to compare the *gross* profiles on the sample of mobile and stable workers and on the sample of mobile workers only (figure 7). Profiles for all workers and for stable workers only are fairly close, respectively in 1977, 1985 and 1993. We take this as an indication that, on the question of the evolution of age profiles, the selection bias arisen from mobility toward other firms is not likely to drive the results.

Mobility toward unemployment is more likely to be a problem. Indeed, if the trap is a low employment trap, it means that more older workers left employment, and that those workers are probably those that did not get any training. By omitting these workers when computing probability of access to training, we directly overestimate the rate of access on the complete population in 1993. To what extent can this drive the results? As a rough check, we take the strongest assumptions, those that would lead to the maximum bias. Indeed, let us assume that *all* workers that left employment in 1993 got or would have got no training. Then, if the employment rate at age A is $x\%$, we need to multiply the observed rate of access by $x\%$ at age A to estimate the access over the complete population. We make that correction for 1977, 1985 and 1993. Is this sufficient to make us change our conclusions? Under these extreme assumptions, no significative decrease can be seen between 1977 and 1985. The decrease between 1985 and

[5] The empirical debate on the role of skill-biased technological change as an explanation for European unemployment gives another interesting example where the choice of the metric (for the evolution of relative unemployment of the unskilled) dramatically changed the results. The choice of the metric was not obvious, although there are some attempts to ground it on structural modelling (see in particular [14]).

1997 gets significative (in difference terms). Overall, we can conclude that the selection bias can not have driven the results, that remain fairly robust to the correction.

3.5 Evolution of access to training of unskilled workers

We need to check that, by looking at the overall working population, we have not missed big changes for one particular category of workers. As attention has been drawn upon unskilled workers, we focus on them.

We derived profiles by job positions separately for the manufacturing and service sectors (using five categories of "catégories socio-professionnelles"). Between 1977 and 1985, profiles are, again, remarkably stable. Between 1985 and 1993, for skilled and unskilled manual workers in the manufacturing sector, access to training increased at all ages and relative access of older workers rather increased (see figures 8 and 9). Evidence for a drop at old age among unskilled workers is unclear (samples are becoming too small). Overall, the same conclusions hold as for the complete population.

3.6 Evolution of access to training in large manufacturing firms

Another assumption of the statistical model might be misleading: we assume that age profiles at a given date are the same across industries. This is certainly not true and it might be the case that the trap worked in some industries and not in other. Figure 10 and 11 provide the net profiles in the manufacturing and service sectors. Again, the first key result is that profiles were stable between 1977 and 1985. A second order result, though, is that there is some evidence of a decline in relative access to training after age 50 in manufacturing.

Looking even more specifically at large manufacturing firms seems therefore necessary as they made particularly strong use of pre-retirement schemes. We conduct the same analysis (probit model) on the sub-sample of firms with more than 500 employees in the manufacturing sector (figure 12). Again, the most striking feature is the strong increase in access to training at all ages. Globally, profiles are quite similar to those observed for the whole sample. Let us notice, though, that relative rates of access (in difference) vary more, as the average level of access is higher. Can we interpret these results as more evidence for the trap in manufacturing, and especially in the big manufacturing firms? Differences across sectors are real, but not so strong. However, they are consistent with the view that sectors that relied more heavily on pre-retirement schemes did experience some slight decrease in the relative access of older workers to training.

To conclude this section, we are faced with two stylized facts: (i) Relative access to training across ages is remarkably stable, especially between 1977 and 1985, where shortened careers should already have played a role; (ii) Access to training has considerably increased at all ages between 1985 and 1993. Overall, our test of the trap is negative: we will come back to interpret it in section 5. But before that, section 4 explores how the accelerated obsolescence of initial training might, from a theoretical view point, explain the rise in training at all ages.

4 WHY DID ACCESS TO TRAINING RISE AT ALL AGES? HYPOTHESES ON THE ROLE OF THE OBSOLESCENCE OF INITIAL TRAINING

Can the accelerated obsolescence of initial training (which we shall consider as part of education) explain the rise in training at all ages? The story could be the following. Assume that a shock, e.g. a change in the nature or the rhythm of technological change, accelerates the obsolescence of education. Productive skills learned at schools are depreciated more rapidly. The firm and the worker then have incentives to replace these skills through training, and this is true at all ages. Moreover, the impact of the obsolescence is stronger for older workers, whose education is most out of date. They have the strongest incentive to train. As a result, training increases at all ages, and relatively more for older workers. Before briefly formalizing the story in a model, let us detail the assumptions on which it rests.

4.1 Assumptions

The structure of the model is the same as in section 2; again, we solve for the optimal profile of a representative employee. Here are the key additional assumptions:

1. Education has two end products, "learning skills", skills that do not directly increase productivity but enhance further learning, and "productive skills", that directly increase productivity. (Typically, general schooling develops learning skills relatively more than productive skills, and vice-versa for vocational training, but both develop the two.) Productive skills are dated: new generations of students get more up-to-date productive skills, there is a vintage effect. These productive skills are substitutes with firm-provided training, which replaces old productive skills learned at school with more up-to-date productive skills as new technologies develop. Learning skills, at the opposite, are not directly productive. They correspond to both innate ability (in which case they are not "produced", but only "signalled" by education) and to learned abilities. In turn, they make learning of productive skills through firm-provided training more efficient. They are thus complementary to firm-provided training.

   We introduce that distinction between learning skills and productive skills to clarify the interrelations between schooling and firm-provided training. On one hand, more educated workers empirically get more training. Does this mean that all of education is complementary to training, or that one dimension of education fosters learning at training? We take the latter view. The distinction also refers to broader empirical findings and theoretical views summarized in [13]. In particular, one of the key messages is that "early learning begets later learning". On the other hand, some productive skills learned at school become out of date and need to be substituted for.

   We note a the learning skills and T_0 the productive skills acquired by our representative agent at school.

2. Productive skills learned at school and through firm-provided training depreciate. We assume the same depreciation pattern: this stresses the similar nature of T_0 and T_1 - T_2 (we note λ the depreciation factor after one period, and $f(\lambda)$ the depreciation factor after two periods. Obviously, $0 < f(\lambda) < \lambda < 1$.

3. Although we discuss further extensions, we keep the investment in both components of schooling as exogenous. For sure, this is not right in the long term. Students may in particular choose a stronger share of learning skills if productive skills depreciate too fast. On the other hand, there certainly is also some inertia on the short period we look at (between 1985 and 1993).

4.2 Model with exogenous education

With the same principles as in section 2, the productivity in each periods depend on past training and education levels. In particular,

$$\pi_3 = (f(\lambda)T_0 + \lambda a T_1 + a T_2 + \epsilon)^\gamma \tag{11}$$

$\gamma < 1$ has been introduced to capture the substitution between T_0 and (T_1, T_2). a intervenes as a multiplicative factor, to capture complementarities with firm-provided training.

And, with the same reasoning as before on the risk of non-employment, the expected surplus becomes:

$$S = T_0 - C(T_1) - WR_1 + \beta((\lambda T_0 + aT_1)^\gamma - WR_2 - C(T_2)) + \frac{\beta^2}{4k}((f(\lambda)T_0 + a\lambda T_1 + aT_2)^\gamma + k - WR_3)^2 \tag{12}$$

First-order conditions implicitly define optimal T_1 and T_2 :

$$C'(T_2) = a\beta\gamma K \tag{13}$$

$$C'(T_1) = a\beta\gamma[(\lambda T_0 + aT_1)^{\gamma-1} + \lambda\beta K] \tag{14}$$

where we define

$$P = \frac{(f(\lambda)T_0 + a\lambda T_1 + aT_2)^\gamma + k - WR_3}{2k} < 1$$

the probability of unemployment and

$$K = K(T_0, T_1, T_2, a, \lambda) = (f(\lambda)T_0 + a\lambda T_1 + aT_2)^{\gamma-1} P$$

The acceleration of the obsolescence of productive skills (learned at school or provided by firm training) is equivalent to a shock on λ: $d\lambda < 0$.

The comparative static of the equation gives:

$$C''(T_1)dT_1 = a\beta\gamma[(\gamma-1)T_0(\lambda T_0 + aT_1)^{\gamma-2}d\lambda + (\gamma-1)a(\lambda T_0 + aT_1)^{\gamma-2}dT_1 + \beta K d\lambda + \beta\lambda dK] \tag{15}$$

$$C''(T_2)dT_2 = a\beta\gamma dK \tag{16}$$

.

The return on training T_2 has unambiguously increased, as T_2 is complementary to T_1 and T_0 whose depreciation has accelerated: $dT_2 > 0$, which in turn implies that $dK > 0$ (through the last equation). The return on T_1 is affected by contrary effects: in the first equation, the first effect is a kind of negative price effect, as $d\lambda$ can be interpreted as an increase in the usage cost of human capital T_1; the second effect is linked to the decreasing return, and comes as an attenuation effect, positive if $dT_1 < 0$, negative otherwise; the third effect is again the negative price effect, but for period 3; eventually, the fourth effect is a positive substitution effect as the decrease in λT_0 gives incentive to increase T_1. The net effect on marginal return on T_1, hence the optimal response dT_1, is ambiguous. Again, it is interesting to look at the relative evolution of T_1 and T_2:

$$\frac{dT_1/d\lambda}{dT_2/d\lambda} = \frac{C''(T_2)}{C''(T_1) - (\gamma - 1)a(\lambda T_0 + aT_1)^{\gamma-2}}[\frac{(\gamma - 1)T_0(\lambda T_O + aT_1)^{\gamma-2}d\lambda}{dK} + \beta\frac{d\lambda}{dK} + \beta\lambda] \quad (17)$$

One of the decisive elements in this equation is $\frac{d\lambda}{dK}$, which refers to the relative impact of the obsolescence of productive skills after one or two periods. If the impact after two periods is dominant, then $\frac{d\lambda}{dK}$ is close to 0 and the dominant term is $\beta\lambda$, which is less than one, but more than 0. Under these conditions, we get $0 < \frac{dT_1/d\lambda}{dT_2/d\lambda} < 1$.

To conclude, training at the end of the career clearly increases. Training at the beginning of the career increases only if the substitution effect (the replacement of school productive skills) dominates the negative price effect due to increased depreciation. At any rate, training at the beginning of the career increases less than at the end of the career.

4.3 Introducing endogenous education choice

What happens if education choices take into account the accelerated obsolescence of productive skills? Although formally deriving simultaneous choice of a, T_0, T_1 and T_2 is cumbersome, one can see that the following effects would be added:

- a negative price effect on productive skills T_0, as they depreciate faster
- a shift from productive skills T_0 to learning skills a
- a positive complementarity effect between a and increased training, T_1 and T_2 (increasing the chances that $dT_1 > 0$).

Overall, this informal discussion suggests that with endogenous education choices, the acceleration in the obsolescence of productive skills leads to a reduced educational demand for productive skills to the benefit of learning skills, to an increased relative level of training at older ages, while possibly re-enforcing the need for firm-provided training at all ages.

4.4 Consequences for the identification of the trap over the 1985-1993 period

The model with accelerated obsolescence of productive skills gives a plausible explanation for the rise of training at all ages. It can also lead to a more important rise in training for older workers. It can therefore potentially explain the absence or the small magnitude of the decrease of relative access of older workers to training between 1985 and 1993: its positive impact would have offset the negative impact of shortened career horizons on the relative access of older workers to training.

This is a plausible but tentative interpretation of the results. Our previous test of the trap on the 1985-1993 period relied upon the assumption that, except for changes in the structure of diplomas, job position, firm size, etc., all changes in the age profile of training could be attributed to the trap. We now know that this identification assumption does not hold when the level of training changes that much. Our conclusion is that the test for the trap over the

1977-1993 is inconclusive. However, no dramatic change occurred between 1977 and 1985 in the levels of training. On that period, the evolution of the age profile can be interpreted with more safety. Hence, the most decisive evidence is that this evolution shows no sign of the trap. This is what the next section tries to interpret.

5 INTERPRETING THE EVIDENCE: FROM EXISTENCE TO MAGNITUDE ISSUES

Evidence for the trap is weak. This is surprising as, after all, it seems a fairly basic consequence of the human capital theory that investment in training should decrease when the period to recover the investment shortens! To interpret that paradox, we first acknowledge measurement issues, but then develop two interpretations that take the results seriously. The first one considers reasons why training decisions need not follow the optimal investment path, and could thus underreact to shortened career horizons. The second interpretation explains why the trap could be of small magnitude: in that sense, data should not be interpreted as weak evidence for the existence of the trap, but as (reasonably) strong evidence that the trap is small.

5.1 Measurement issues again

Before taking the results too seriously, one might argue that the difficulty to show the trap comes from insufficient data. Admittedly, simple probabilities to accede training are a poor measure of the investment in training. We tried to build upon available questions about the duration of training, but data could not be readily compared. As there are other empirical puzzles with the same data (e.g., the absence of impact of training on wages, as in [11]), one might be tempted to accuse the data. However, we also see that the overall shape of the profiles fit our understanding of training: not everything is wrong. Dismissing the data might be too cautious, or too easy.

5.2 Reasons for underreaction to the career horizons

Becker's theory of human capital is a theory where training decisions are optimal, except for credit market imperfections. As we mentioned in the introduction, a competing theory insists upon imperfections in the labor markets that can lead to suboptimal training decisions [1]. This can in turn affect the responses to changes in the environment - here, changes to retirement prospects. The basic idea is that there is no unique residual claimant to the return on training. The firm gets some part of return, thanks to "wage compression", but not the whole return, as part of it goes to the worker. If, as discussed by Acemoglu and Pischke, the firm finances the training[6], it will underinvest. But it will also underreact to a change in the return, as it perceives only part of the change in the return. Hence if the time to recover the investment is reduced, it will not reduce training by the optimal amount.

5.3 Arguments for a small trap

As stressed in the introduction, no one doubts that training depends on employment prospects. To take an extreme example, nobody would train today if stopping to work tomorrow. But the

[6] In [1], various equilibria are examined; complete firm funding is one of them, and seems (from casual evidence) empirically relevant for France

question is: how long a period do you need to be paid back for your investment in training? If the answer is just a few years, say two, then the idea of the trap is of little practical relevance, and looks more like a theoretical curiosity. It is interesting to see that human resource specialists tend to believe that relevant payback periods for firm-provided training are not much more than 3 years (see [12]).

One back-of-the-envelop calculation might help to assess the likely magnitude of the effect of lower employment at old age on previous training decisions. Assume, as a less radical assumption, that half of training effects must take place over 3 years: this implies a depreciation rate of 21% per year. Add 5% to take into account preference for the present (or to match required return on investments). Define the time horizon for the training investment of a worker aged A as the expected number of years that worker is likely to stay employed before retirement, discounted at the 26% rate. To compute that number for a representative worker, assume that his expected probability to be employed at age A' is equal to the employment rate of workers currently aged A'. Under these assumptions, it is possible, in 1977, 1985 and 1995 to compute the time horizons for training investments at different ages (see figure 13). As employment rates decrease between 1977 and 1993, time horizons are always smaller, for a given age, in 1977 than in 1993. But before workers are over 55-60, the difference is never very big. Being 55 in 1985 is equivalent to be 58 in 1977 (i.e., it gives you the same horizon of return), and that is the biggest difference. What is the corresponding difference, in 1977, in training at age 58 compared to training at age 55? The difference is rather small: the rate of access falls by about one point of percentage. Hence, the magnitude of the effect predicted by human capital theory, if there is no other change between 1977 and 1985 than a change in the employment prospects, and if the profile in 1977 reflects the decreasing horizon of return, is of about one point of percentage. This is a small amount, and it is understandable that we fail to see the difference in the data.

It is interesting to compare these admittedly quick calculations to estimates of the time horizon considered by older workers when deciding or not to invest in computer skills in the United States (see [8]). "People aged 60-64 in 1993 kept close to younger workers earlier, from 1984 to 1989; their computer use rose 8.9 percentage points, compared to 12.9 for people aged 45-49 in 1993. From 1989 to 1993, however, their gain was 4.1 points, compared to 11.4 for the younger group. Thus, they failed to keep up with younger workers *as* they neared retirement, though they had previously." Strikingly, the effect of retirement prospects (retirement peaks at age 62 and 65 in the United States) is apparent only a few years before. This is consistent with our interpretation of the French data.

6 CONCLUSION

Our key finding is that if there is a trap for low employment and low training in France, it is a small one. Focusing on it should not prevent from looking for more decisive sources for the low employment rates of older workers in France.

One issue that remains open is the reason why access to training rose so dramatically during the second half of the 80s. Accelerated obsolescence of productive skills is a natural candidate, and we checked that it could in theory explain the rise (as well as changes in the profile), but we did not provide any decisive evidence. It is likely that this would require looking for firm level data: how does the rate of innovation, but also most likely the re-organization choices (see [2]) impact the amount of training? How does this vary across ages?

More generally, the difficulty to interpret the rising access to training illustrates our limited understanding of training decisions by firms and workers. Studies that unsuccessfully track the return on training are yet another illustration. Improving our understanding of these behaviors is probably necessary to promote training usefully, and to better ground policies that might sometimes, in Buechtemann's words[7], still rest by default on an "act of faith".

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Table 0: Descriptive statistics

		1977	1993
Sample size		9899	3894
Rate of access to training		11,72	32,79
CS (%)	"Cadres"	10,48	9,42
	"Prof. interméd."	20,54	20,98
	"Employés"	20,41	24,14
	Skilled manual workers	19,75	29,28
	Unskilled manual workers	28,83	16,18
Secteur (%)	Agriculture	3,03	1,90
	Ind AA	4,95	4,65
	Utilities	0,91	3,16
	Intermediary goods	16,25	11,35
	Equipment goods	11,22	13,74
	Consumption goods	18,67	8,63
	Building	9,61	8,09
	Trade	2,81	13,91
	Transports and telecom.	13,45	7,29
	Services marchands	11,76	16,38
	Insurance and finance	2,53	6,02
	Services non marchands	4,83	4,90
Firm size (%)	<10 salariés	14,94	21,37
	10 à 49	12,33	19,11
	50 à 499	21,71	26,78
	>500	31,53	26,78
	missing data	19,49	-
Diploma (%)	>bac+2 (I et II)	3,99	5,50
	Bac+2 (III)	1,78	6,54
	Bac or brevet prof. (IV)	8,70	10,99
	CAP or BEP (V)	18,24	36,65
	BEPC (Vbis)	6,75	5,96
	No diploma or CEP (VI)	60,43	34,39
Part time (%)		4,09	8,50
Gender	Women (%)	32,05	36,65

Table 1. Selection into training (probit model)

Dependent variable: "has received firm-provided training over the past 5 years"

	1977		1985		1993	
	Coefficient	**Std. Err.**	**Coefficient**	**Std. Err.**	**Coefficient**	**Std. Err.**
Year effect			-0,94	0,42	0,51	0,50
Age (ref. 20)						
Age 25	0,12	0,12	0,66	0,20	0,07	0,36
Age 30	0,14	0,12	0,58	0,19	0,15	0,35
Age 35	0,05	0,12	0,56	0,19	0,13	0,35
Age 40	-0,13	0,12	0,47	0,20	0,11	0,35
Age 45	-0,23	0,12	0,23	0,20	0,14	0,36
Age 50	-0,48	0,13	0,21	0,20	-0,21	0,36
Age 55	-0,73	0,14	-0,10	0,21	-0,37	0,36
Age 60	-1,19	0,20			-0,92	0,44
CS (ref. Cadres)						
Prof. Intermédiaires	0,09	0,07	0,17	0,07	-0,03	0,09
Employés	-0,15	0,09	-0,08	0,09	-0,24	0,11
Skilled manual workers	-0,26	0,09	-0,20	0,08	-0,52	0,11
Unskilled manual workers	-0,71	0,09	-0,60	0,10	-0,88	0,12
Industry (ref. Agriculture)						
Ind AA	0,18	0,22	0,41	0,27	0,01	0,24
Utilities	0,43	0,26	0,03	0,37	0,80	0,25
Intermediary goods	0,04	0,21	0,42	0,27	0,17	0,23
Equipment goods	0,01	0,21	0,45	0,27	0,14	0,22
Consumption goods	-0,03	0,21	0,29	0,27	-0,14	0,23
Building and construction	-0,42	0,22	0,05	0,27	-0,23	0,23
Trade	-0,04	0,24	0,26	0,27	-0,10	0,22
Transports and telecom.	-0,12	0,21	0,32	0,28	0,21	0,23
Services marchands	-0,03	0,21	0,41	0,26	0,08	0,22
Insurance and finance	0,37	0,22	0,57	0,28	0,46	0,23
Services non marchands	-0,06	0,24	0,42	0,28	-0,02	0,24
Firm size (ref. <10 employees)						
10 to 49 employees	0,26	0,08	0,27	0,08	0,24	0,08
50 to 499 employees	0,54	0,07	0,46	0,08	0,45	0,07
>500 employees	0,65	0,07	0,62	0,08	0,69	0,08
Diploma (ref. no diploma)						
>Bac+2	0,37	0,10	0,28	0,11	0,43	0,12
Bac+2	0,27	0,13	0,39	0,10	0,54	0,10
Bac or Brevet professionnell	0,31	0,07	0,40	0,07	0,71	0,08
CAP or BEP	0,19	0,05	0,22	0,05	0,37	0,06
BEPC	0,19	0,08	0,22	0,08	0,27	0,10
Part-time	-0,52	0,21	-0,34	0,12	-0,22	0,10
Gender Woman	0,23	0,05	0,16	0,05	0,18	0,06
Constant	-1,56	0,25	-1,56	0,25	-1,56	0,25

Note: Probit model. 18 822 observations. LR ratio=3147.77.

Table 2. Test of the hypothesis of declining access to training for older workers

Metric	Obs. value	Wald test
1977-1985		
$[Pr(T/age=50to59,t=85)-Pr(T/age=35to44,t=85)]$	0.011	$\chi^2(1)=0.27$
$-[Pr(T/age=50to59,t=77)-Pr(T/age=35to44,t=77)]$		Signif. at 0.60
1977-1993, relative access in difference		
$[Pr(T/age=50to59,t=93)-Pr(T/age=35to44,t=93)]$	-0.044	$\chi^2(1)=2.94$
$-[Pr(T/age=50to59,t=77)-Pr(T/age=35to44,t=77)]$		Signif. at 0.09
1977-1993, relative access in ratio		
$\frac{Pr(T/age=50to59,t=93)}{Pr(T/age=35to44,t=93)}-\frac{Pr(T/age=50to59,t=77)}{Pr(T/age=35tp44,t=77)}$	1.15	$\chi^2(1)=0.27$
		Signif. at 0.60

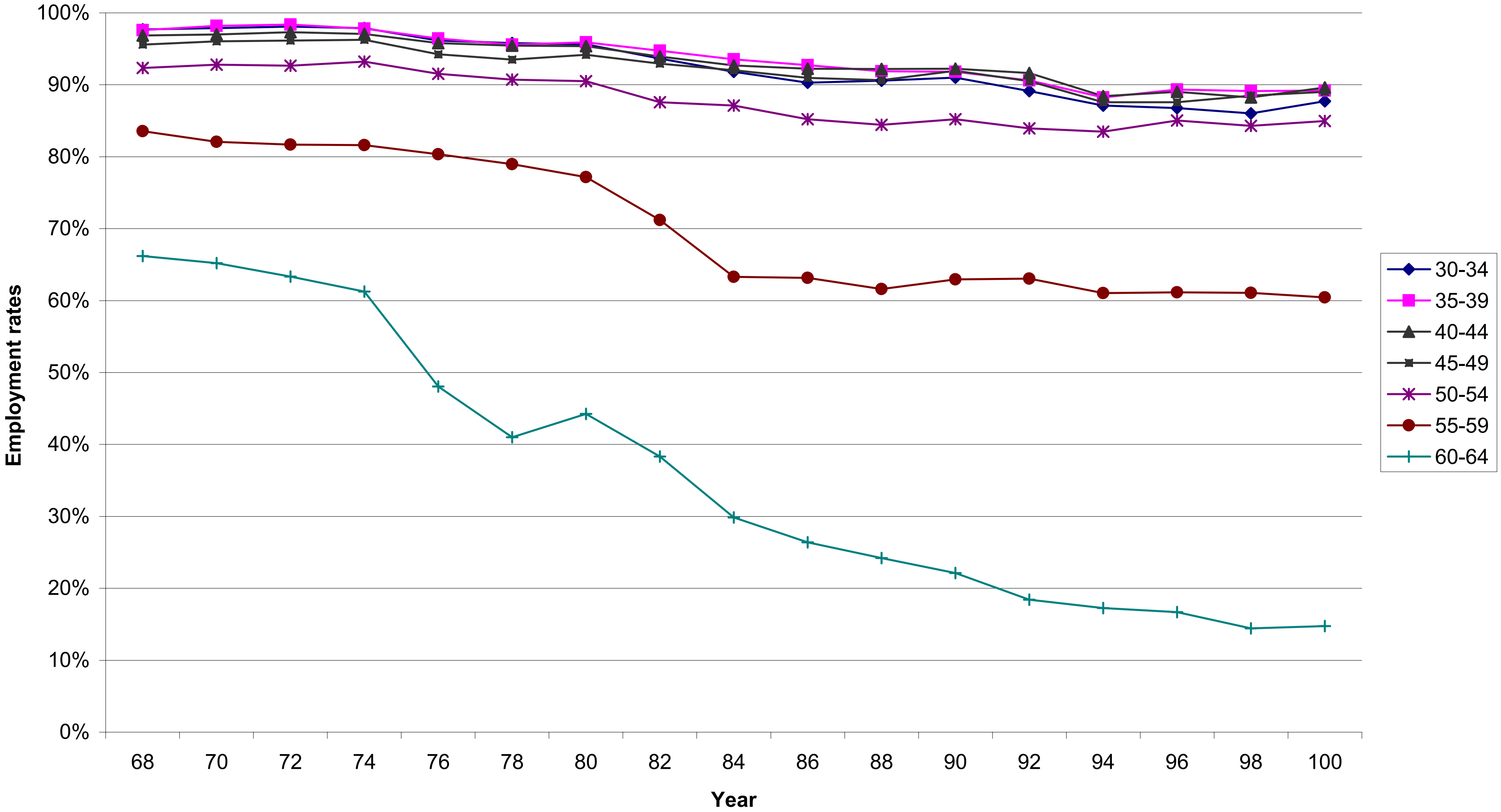
Note: Non-linear Wald test for the metric (left-hand column) to be equal to zero
Probabilities are computed with control variables of the probit model taken at their sample mean values (mean over all observations, on years 1977 and 1993).

Table 3. Test with correction for selection bias

Metric	Obs. value	Wald test
1977-1985		
$[0.75Pr(T/age = 50to59, t = 85) - 0.93Pr(T/age = 35to44, t = 85)]$	0.007	$\chi^2(1) = 0.15$
$-[0.86Pr(T/age = 50to59, t = 77) - 0.96Pr(T/age = 35to44, t = 77)]$		Signif. at 0.70
1977-1993, relative access in difference		
$[0.74Pr(T/age = 50to59, t = 93) - 0.91Pr(T/age = 35to44, t = 93)]$	-0.062	$\chi^2(1) = 8.40$
$-[0.86Pr(T/age = 50to59, t = 77) - 0.96Pr(T/age = 35to44, t = 77)]$		Signif. at 0.004
1977-1993, relative access in ratio		
$\frac{0.74Pr(T/age=50to59,t=93)}{0.91Pr(T/age=35to44,t=93)} - \frac{0.86Pr(T/age=50to59,t=77)}{0.96Pr(T/age=35tp44,t=77)}$	1.1	$\chi^2(1) = 0.05$
		Signif. at 0.83

Note: Non-linear Wald test for the metric (left-hand column) to be equal to zero
Probabilities are computed with control variables of the probit model taken at their sample mean values (mean over all observations, on years 1977 and 1993) and then multiplied by the employment rate of the age category.

Fig. 1 : Employment rates for men by age categories in France



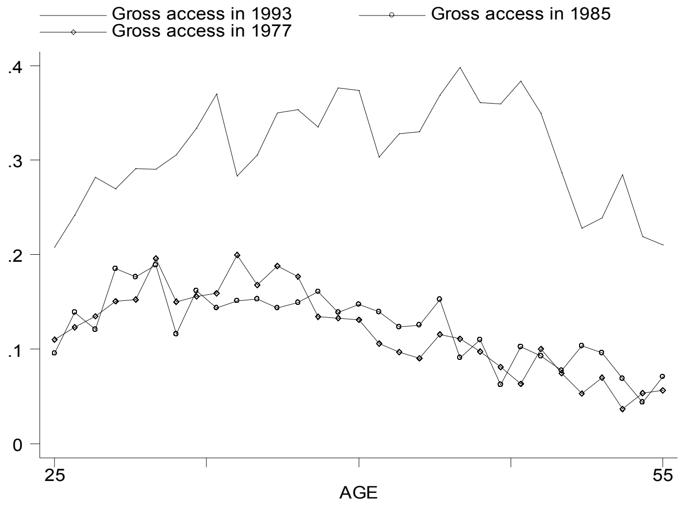


Fig.2 Gross access to training, 1977, 1985 and 1993

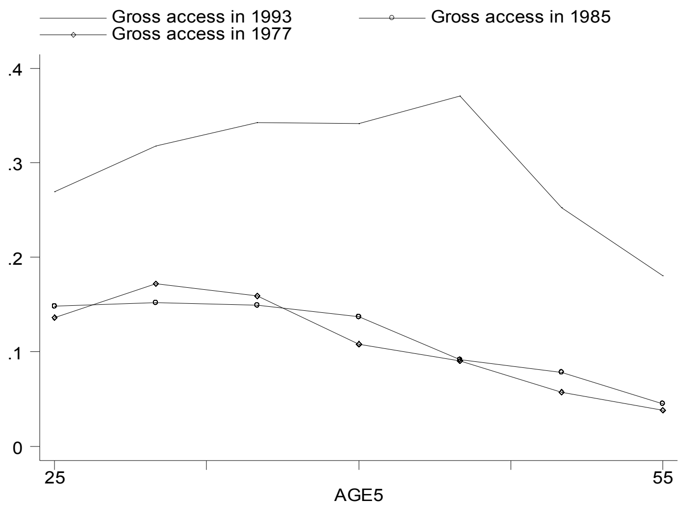


Fig.3 Gross access to training, 1977, 1985 and 1993

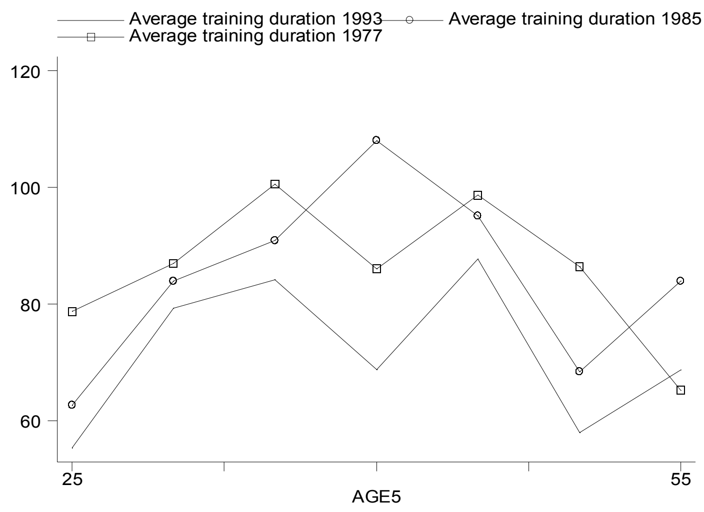


Fig.4 Average training time, 1977, 1985 and 1993

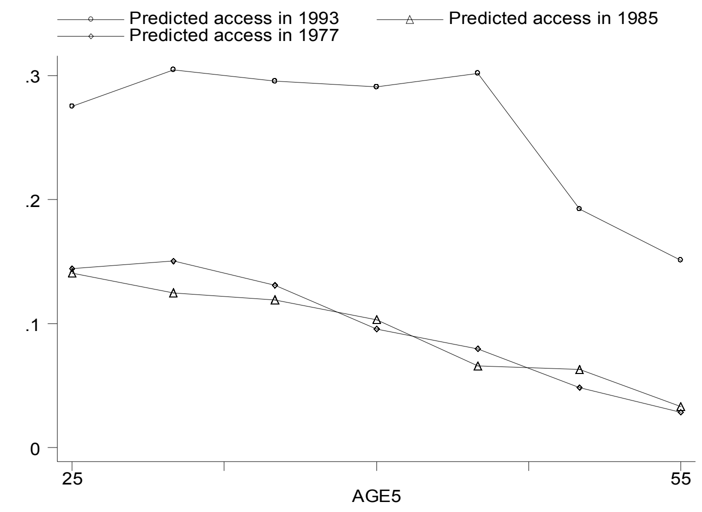
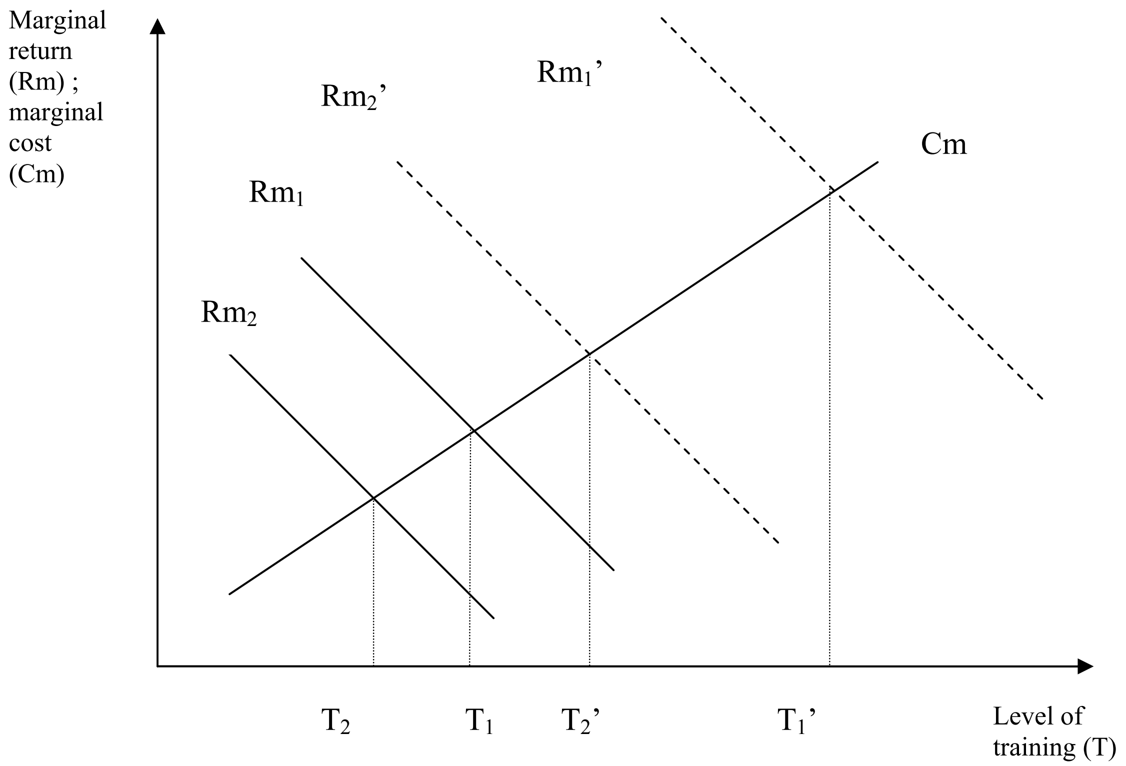


Fig.5 Predicted access to training, 1977, 1985 and 1993

Fig. 6 : Impact of a proportional increase in marginal returns to training on the age profile of investment in training



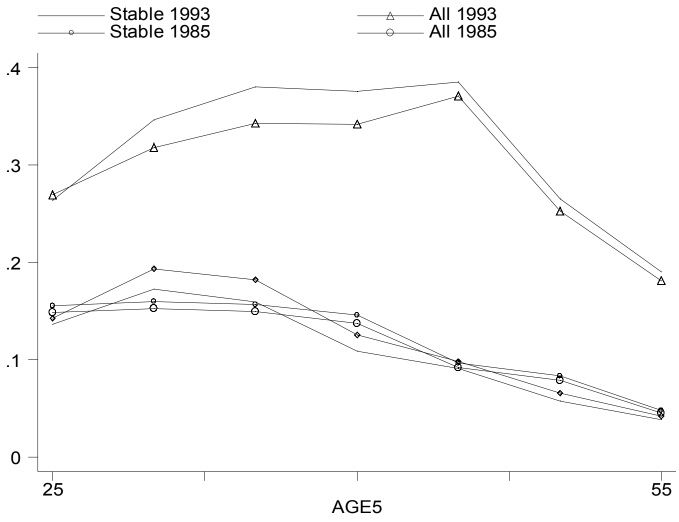


Fig.7 Access to training - movers vs. non-movers

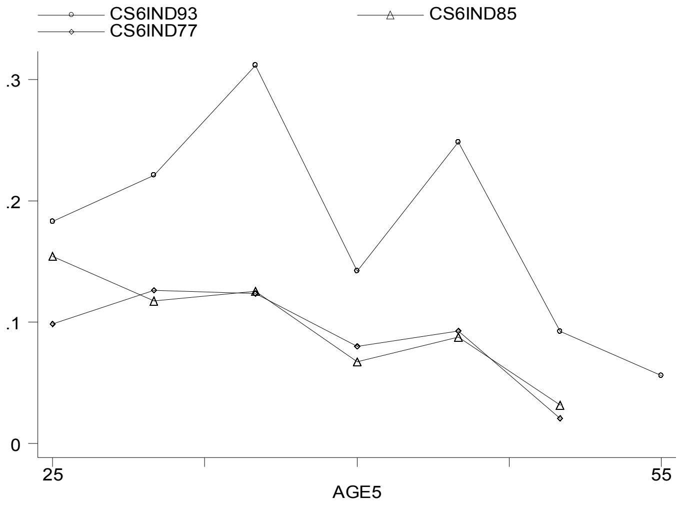


Fig.8 Predicted access to training - skilled manual workers

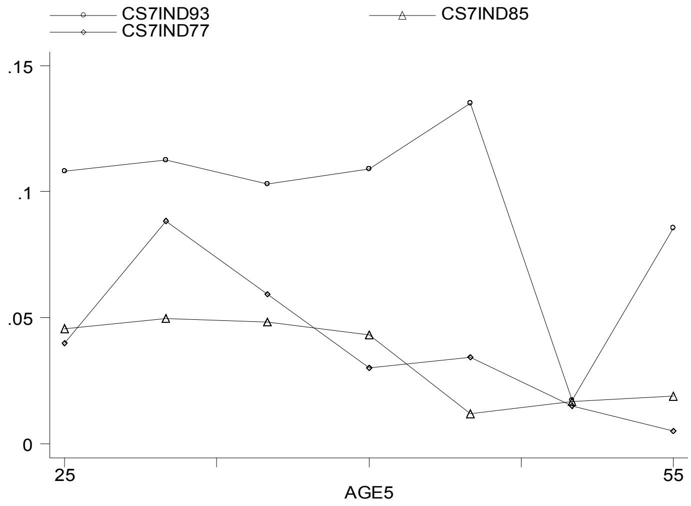


Fig.9 Predicted access to training - unskilled manual workers

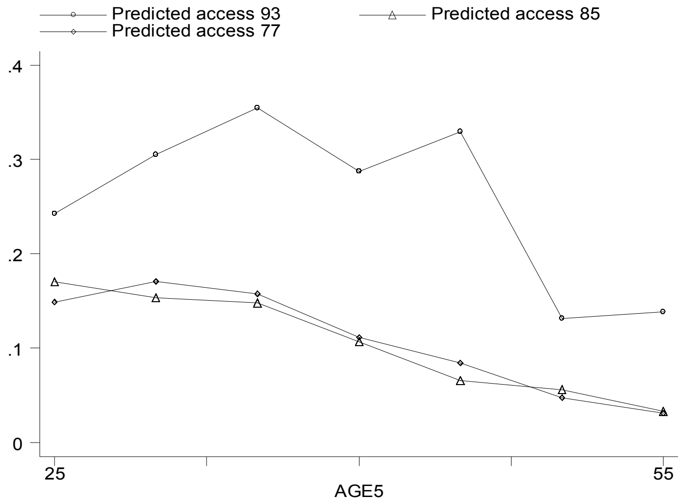


Fig.10 Predicted access to training - manufacturing sector

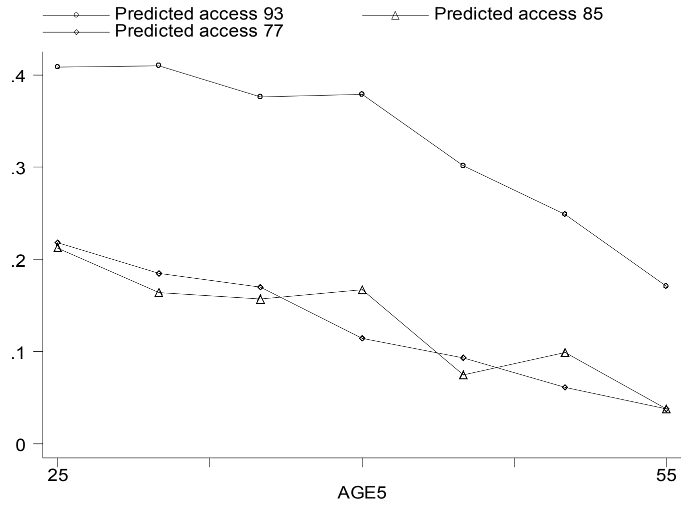


Fig.11 Predicted access to training - service sector

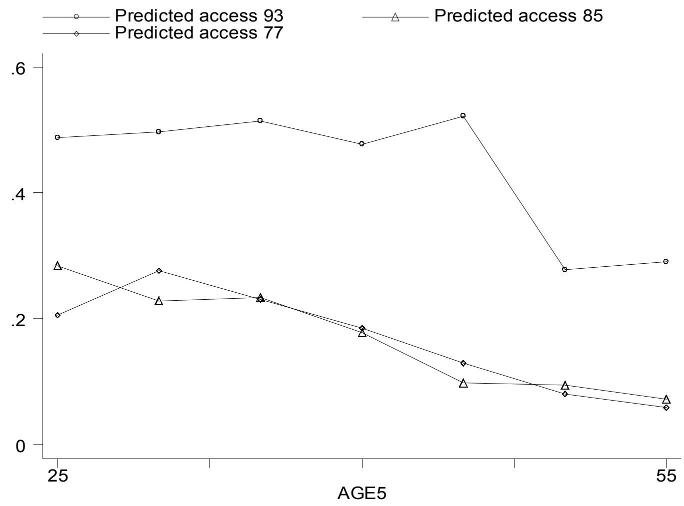


Fig.12 Predicted access to training - big manufacturing firms

Fig. 13: Payback horizons for training according to the age