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Abstract

This paper examines the impact of the business cycle on school-leaving decisions in France for the period 1983-2009. Business cycle effects are twofold. On the one hand, bad economic conditions reduce the opportunity cost of schooling and may induce higher school participation. On the other hand, it could entail a loss of income for families which may bear no more the cost of their children's education. Using the French Labor Force Surveys, we estimate the effects of current and past unemployment rates on school leaving decisions. We find that some students postpone their entry into the labor market during an economic crisis. Younger students and students from lower social background at a given age are slightly more likely to delay their entry in the labor market. These effects are statistically significant but weak. Our results suggest that most students have an education target level or that only few of them are able to anticipate or postpone their entry to mitigate the effects of the business cycle.

Keywords: Business cycle, Endogeneous labour market entry, Initial labour market conditions

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Continuer les études pour laisser passer la crise ?
L'effet du cycle économique sur l'âge de fin d'études

Résumé

Ce document étudie l'effet du cycle économique sur la décision de sortie du système scolaire en France, de 1983 à 2009. En théorie, l'impact de la conjoncture est ambigu. Une mauvaise conjoncture réduit les possibilités d'emploi des jeunes et pourrait les inciter à rester plus longtemps dans le système scolaire. Mais, à l'inverse, une situation économique dégradée peut fragiliser la situation financière de certains parents, qui ne pourraient dès lors plus payer le coût des études de leurs enfants. À l'aide des enquêtes Emploi, nous estimons l'effet du chômage courant et passé sur la décision de quitter l'école (avec ou sans diplôme). Nous trouvons que seule une faible part des lycéens et étudiants repoussent leur entrée sur le marché du travail en restant à l'école lors des périodes de mauvaise conjoncture. Les plus jeunes et ceux dont le père est ouvrier ou employé ont légèrement plus tendance à repousser leur sortie d'études. Nos résultats suggèrent que la plupart des étudiants décident une fois pour toutes de leur niveau d'études, ou que seule une faible part d'entre eux sont en mesure d'anticiper ou de repousser leur sortie du système scolaire pour se protéger des effets du cycle économique.

Mots-clés : Cycle économique, endogénéité de la date d'entrée sur le marché du travail, conjoncture à l'entrée du marché du travail

Classification JEL : I21 - J24

1 Introduction

A great amount of economic literature is dedicated to understanding the determinants of demand for education. Lot of these determinants have been extensively studied in the empirical literature: returns to education, social background, education supply, *etc.* By contrast, only few papers focus on the links between the business cycle and the decision to leave school.

Bad economic conditions may have two opposite effects on school participation. On the one hand, they entail reduced job opportunities for school leavers. This reduces the opportunity cost of schooling and may induce higher school participation. Thus, school attendance may be countercyclical: enrollment could rise with unemployment. But, on the other hand, adverse economic conditions generate unemployment. If some families, affected by unemployment, become financially constrained and cannot borrow to invest in education, this would tend to lower the school enrollment rate. This would also be the case if some students finance their studies by working and cannot find appropriate jobs anymore because of bad labor market conditions. When considering both potential effects, it is difficult to predict the direction and the intensity of the impact of unemployment on school enrollment.

In this paper, we empirically investigate this question, using French data over the period 1983-2009. We focus on annual retention rate which is defined as the proportion of a cohort enrolled in school in the previous year that is still enrolled in the current year. The effect of unemployment on the probability of leaving school is statistically significant, but relatively weak. According to our main specification, young students aged 18 have a probability of 9.6% of leaving school when the youth unemployment rises from 18% to 25%, and a probability of 11.3% when unemployment drops from 18% to 15%.[1] The difference between both probabilities is statistically significant but weak. The effect seems to be larger for young people aged between 16 and 20 years. We also find a larger effect for young people from lower social background at a given age. In comparison, the probability of leaving school at 18 year old decreased by about 10 percentage points between the mid-1980s and the mid-1990s in response to an educational policy. Finally, we do not find any difference between men and women.

Our results contribute to the scarce literature about business cycle effects on school-leaving decisions. As far as the effect of business cycle on demand for education could be country-specific, dependent on the schooling system, collecting results for different countries is important. In particular, France presents several

[1] During our period of analysis, French youth unemployment ranged from 14% to 24%.

peculiarities. For example, tuitions in France are very low compared to tuitions in the U.S.. French students are also less often employed during their studies than in the U.S.. Moreover, before the post-secondary education's reforms in the 2000s, almost every student completing one more year of post-secondary education could earn a new degree ("DEUG" for two years of post-secondary education, "licence" for 3 years, "maitrise" for four years and "DEA" or "DESS" for five years). Remaining longer at school therefore entailed not only a higher level of schooling but also a higher degree. Yet, our results are in line with most of the papers on other countries. They suggest that most students have an education target level or that only few of them are able to anticipate or postpone their entry to mitigate the effects of the business cycle.

These results are of primary interest for empirical work aiming at measuring the so-called *scarring effect*: *i.e.*, how much income will one lose when she leaves school during an economic crisis? We show that, although school leaving year endogeneity cannot be completely discarded, the bias should remain very small.

This paper is organized as follows. Section 2 summarizes the main results of the (scarce) literature on our subject. Sections 3 and 4 describe our dataset and the econometric model, while sections 5 and 6 present our results and proceed to some robustness checks. Section 7 concludes.

2 Literature

The retention phenomenon has been little studied in the literature. Most of the papers we are aware of focus on the U.S. and find a non significant or small positive relationship between unemployment and school enrollment rates. For instance, Betts and McFarland (1995), using US data on community college between the late 1960s and the mid-1980s, find that a 1 percentage point increase in the unemployment rate of recent high school graduates (respectively of adults) is associated with a rise in full-time school attendance of about 0.5% (resp. 4%). Card and Lemieux (2001) use the October CPS files for 1968-1996 and find that a rise in the prime-age male (25-54) unemployment rate from 3.5% to 6.5% is predicted to raise enrollment of seventeen-year-olds by about 1 percentage point. Dellas and Sakellaris (2003), using US data from 1968 to 1988 on college graduates, conclude that a one percentage point increase in unemployment rate is associated with a 2% increase in enrollment rate. Boffy-Ramirez, Hansen, and Mansour (2010) using US data between 1979 and 1994 find that men's odds of enrolling in college increase by 1.2 percentage point following a 1 percentage point increase in the unemployment rate.

Concerning other countries, Messer and Wolter (2010), using Swiss data from 1981 to 2001, and Genda, Kondo, and Ohta (2010) using Japanese data, also find a slightly countercyclical pattern.

Few authors find a negative effect of unemployment on enrollment and underline the role of credit constraints in the demand for education. Using CPS between 1947 and 1974, Edwards (1976) finds that the retention and enrollment rates of teenage girls (16-17-year-olds) vary procyclically, whereas there is no significant relationship for teenage boys. Her explanation focuses on the fact that, after a crisis, the opportunity cost of schooling falls less for girls than for boys because girls' productivity derives for a higher part from home activities. However, these results are at odds with the more recent ones of Card and Lemieux (2001), probably because the opportunity cost of education for young women and the labor market were very different in the fifties and in the eighties. More recently, Christian (2007) using the October school enrollment supplements to the CPS over 1968-2000 finds a slightly positive but insignificant effect of the unemployment rate on enrollment at 18-19 years old and a pro-cyclical effect of business cycle on school participation rate among people in households expected to have lower income.

To sum up, there is a large body of literature consistent with a slightly positive effect of unemployment on school enrollment. One interpretation of this small effect is that the decrease in the opportunity cost of schooling exceeds the potential negative effect on parents' or students' income stemming from credit constraints. Another interpretation, as mentioned before, would be that most students have an education target level and are therefore not influenced by current economic conditions.

Yet, most of the papers focus on the U.S. and the results could depend on the features of educational systems. The French educational system departs from the one of the U.S. on many respects, with a potentially greater effect of the business cycle on schooling decisions. For example, in France students are less often working in a paid job during their studies or more often repeat a grade than in the U.S.. There are also few restrictions in France to high-school and college enrollment. Moreover, before the post-secondary education's reforms in the 2000s, almost each supplementary year of post-secondary education ended by a degree. Remaining longer at school entailed therefore not only a higher level of schooling but also a higher degree. Education costs are also lower in France than in the U.S., which could reduce the cyclicality of schooling decisions. It is therefore interesting to focus on other countries, hereafter on France, to investigate if results are country-specific or not. Finding similar results for countries with very different educational systems would strengthen the education target level hypothesis.

3 Data

3.1 School trajectory

We use the French Labor force surveys (LFS, called in French "Enquêtes Emploi") from 1983 onwards. We focus on men and women pooled together. Using the variable "school-leaving age", we infer school trajectory since 16 year old, the French compulsory school-leaving age.[2] We only retain French citizens and we exclude people older than 40 years old in order to circumscribe "memory bias". We mainly focus on people having been or being at school between 1983 and 2009.[3] People being students at the time of the survey or leaving school the year of the survey are considered as censored information.[4] We focus on school-leaving age between 16 and 24 years old.[5]

We therefore build an unbalanced panel (age-individual) and a person remains in the dataset until her school-leaving age. We create a variable "leaving-school at age a"[6] which takes the value 0 for observations before the school-leaving age and the value 1 only for the year of leaving school.

Let us take an example. In LFS 2005, we observe a respondent aged 30 and who left school at 20 in 1995. This respondent corresponds to 5 observations: one for each age from 16 to 20 (and years 1991 to 1995). From 16 to 19 years old, she could have left school but chose not to do so (our variable "leaving school" takes the value 0). At 20 years old, she decided to leave school (our variable "leaving school" takes the value 1). There is no observation for ages higher than 20 for this person.

3.2 Business cycle indicator

We choose as indicator of economic conditions the unemployment rate of young people on the labor-market (15-24 years old) in the third quarter of the correspond-

[2]It is indicated to the interviewers that any interruption (resp. for more than one year) in the training is considered as the end of initial training in the 2003-2010 questionnaires (resp. 1982-2002).

[3]For robustness checks we also run estimations over the restricted periods 1990-2009 and 1995-2009, see Section 6.

[4]Note that we retain information from 16 to $age - 1$ because some of them can leave school after the date of the interview.

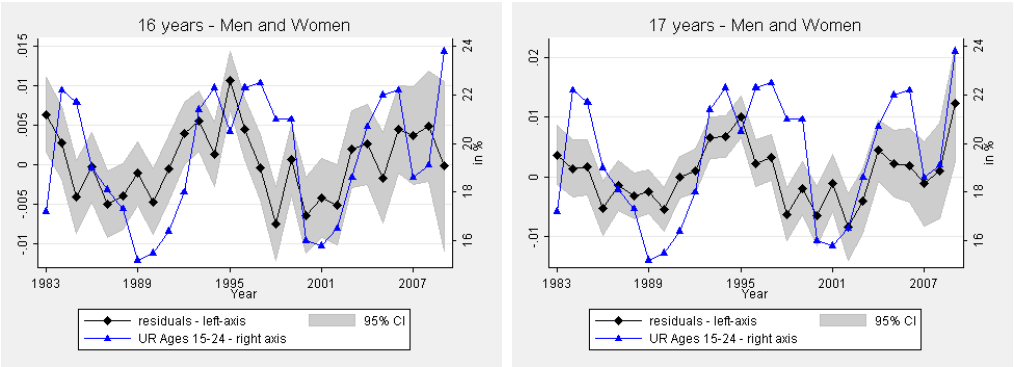
[5]We restrict the analysis to ages 16 to 24 because the number of students older than 24 is low compared to the sample rate.

[6]We retain as definition of age the age reached in the year.

ing year, as French young people leave school mostly during the third quarter (see Appendix A).

Figure 1 displays the unemployment rate of young people between 1983 and 2009 and the probability (in %) of staying at least one more year at school for students between 16 and 24, adjusted for trends in educational attainment (see Appendix B for the same figures without any adjustment).[7] It also displays the same figures for each age-group between 16 and 24. The correlation is positive and higher for 16 to 20 years old than for older age-groups.

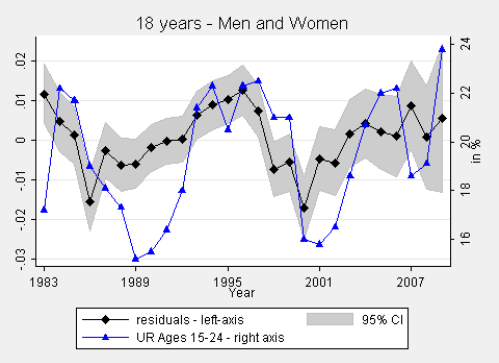
Figure 1: Proportion of students staying at school and current unemployment rate



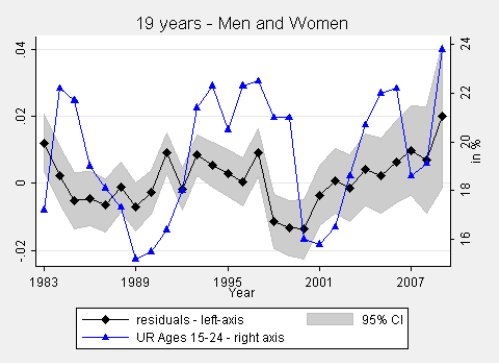
(a) 16 years

(b) 17 years

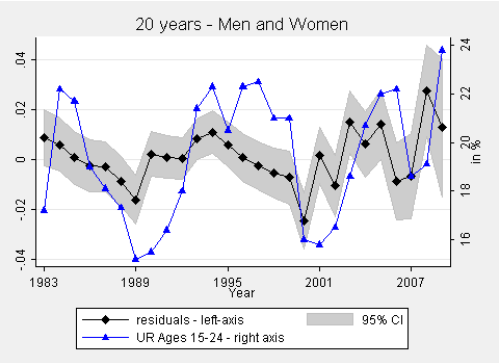
[7]More precisely, we regress the proportion of students staying at school on splines to control for the increase in educational attainment and graph the residuals, see section 4.2.



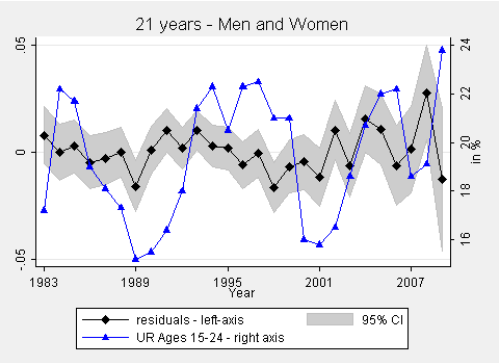
(c) 18 years



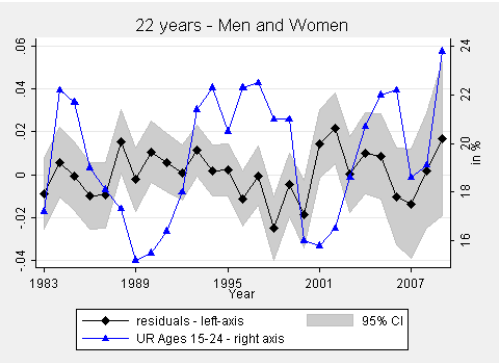
(d) 19 years



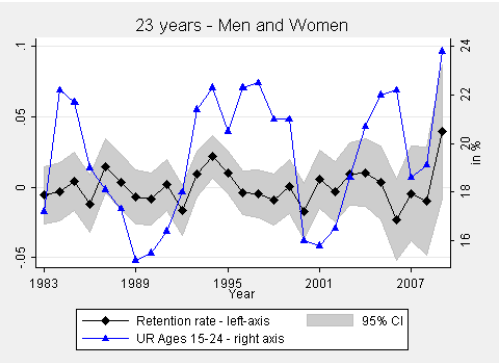
(e) 20 years



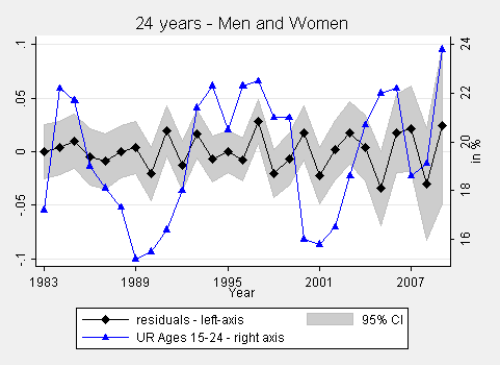
(f) 21 years



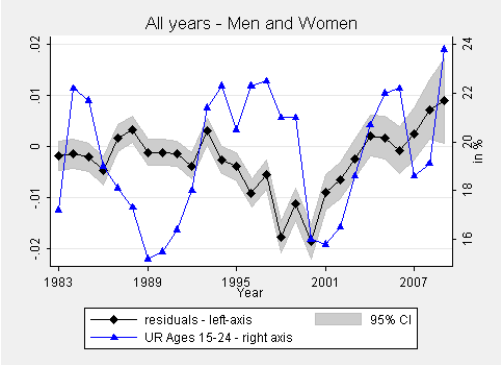
(g) 22 years



(h) 23 years



(i) 24 years



(j) All ages

Note: "residuals" stands for residuals from the logistic regression of the dummy variable "staying at school" on splines.

4 Econometric model

4.1 Taking into account the rise in educational attainment

Our main period of analysis is from 1983 to 2009. France experienced a huge increase in high-school educational attainment from 1985 to 1993 and an increase in post-secondary educational attainment from 1991 to 1995 (see Durier, 2006). This rise in educational attainment can be related to a political impulse in the educational system aimed at reducing unemployment among youngsters – which had been persistently higher than 20% since 1983. Students positively reacted and remained longer at school. This structural trend could entail spurious correlations and bias our estimations if we do not control for it. For example, the increase in post-secondary educational attainment took place during an economic downturn –1993-1997– which could entail a spurious negative correlation between current unemployment and leaving school in our estimation. Conversely, from 1989 to 1992 unemployment rates were low, around 15% and high-school educational attainment increased, potentially leading to a spurious positive correlation. Moreover, the share of students repeating a grade sharply decreased since the end of the 1990s, entailing a downward trend in the attainment rate during the 2000s. It is therefore necessary to control for these trends in educational attainment to disentangle business cycle effects and structural trends effects.

We therefore retain 1983-2009 for our main analysis to have enough time periods to make robust inference controlling for the increase in school attainment. More

precisely, we include a piecewise linear function of time with one trend break in each regression. The timing of the breaks were determined in order to maximize the BIC of the regressions. We finally perform robustness checks on shorter periods of time (respectively 1990-2009 and 1995-2009), to make sure that our results are robust to changes in the observation windows.

4.2 The econometric model

For all ages - pooled regression
We run a logistic regression of past and current unemployment rates (resp. UR_t and UR_{t-1}) on the instantaneous probability of leaving school $L_{i,t}$. We firstly run a pooled regression, assuming homogenous effects at all ages of the unemployment rates on the instantaneous probability of leaving school. This yields the following model:

$$P(L_{i,t}) = F(\alpha+\beta_0.UR_t+\beta_1.UR_{t-1}+\gamma_1.t+\gamma_2.(t-\bar{T})\mathbb{1}_{t\geq\bar{T}}+\zeta_{16}.\mathbb{1}_{a=16}+...+\zeta_{24}.\mathbb{1}_{a=24})$$

More precisely, $L_{i,t}$ is a dummy variable equal to 1 if the student chooses to leave school year t, and to 0 if she chooses to stay at school. We control the regression by piecewise linear function of time with a break at year $\bar{T}$ (year $\bar{T}$ is reported in Table 1) and age dummies.[8] We choose F as logistic function. This model is clearly "coarse" and we will mainly focus on models age per age hereafter, in order to allow for heterogeneity of unemployment effects according to age. Yet, the pooled regression is useful to illustrate the main features of the model and some robustness checks, since only the intensity of the effects but not the sign vary with age (see Table 1).

We are mainly interested in β_0, the effect of the current unemployment rate on school leaving decision. We add the past unemployment rate as a regressor in our preferred specification because it explains the school leaving decision and is correlated with the current unemployment rate, so that, if omitted, the estimated coefficient of the current unemployment rate would be potentially biased downward. To understand this, imagine that unemployment was very high last year. If unemployment has an effect, more students than usual will choose to stay at school. But, for most of them, they won't stay as long in the schooling system as would have done usual students who would have stayed at school whatever the unemployment rate: they have a higher probability to leave school one or two years after having decided to stay (one or two more years) at school. For these two

[8] The set of age dummies would be equivalent to the baseline hazard function in a proportional hazard model.

reasons (past unemployment positively correlated with current unemployment and direct effect of past unemployment on the probability of leaving school), omitting past unemployment could lead us to underestimate the effect of current economic condition on the choice to stay (or to leave) school.[9] This point is very important, because unemployment shows a high degree of persistence. If students postpone their entry into labor market during economic downturns then we should find that β_0 is negative and β_1 positive.[10]

For each age
We also run separated regressions age per age to allow for heterogenous effects of unemployment according to age.

$$P(L^a_{i,t}) = F(\alpha^a + \beta^a_0.UR_t + \beta^a_1.UR_{t-1} + \gamma^a_1.t + \gamma^a_2.(t - \bar{T}^a)\mathbb{1}_{t\geq\bar{T}^a})$$

$L^a_{i,t}$ is a dummy variable equal to 1 if the student chooses to leave school at age a the year t, and to 0 if she chooses to stay at school. We perform a logistic regression of L^a_i on our variables of interest, current and past unemployment rates at the year of aging a. Breaks in trends are age-dependent (years $\bar{T}^a$ are reported in Table 1).

4.3 Individual data, weights and cluster

We rely on individual data for our estimations rather than on aggregrated ones, even if the main source of identification is the variation of the unemployment rate across years. The probability of leaving school is very low for young pupils or students aged 16 or 17 (see Table 1), particularly after the strong increase in educational attainment between the mid-1980s and the mid-1990s. Using a logistic linking function between the unemployment rate and the probability to leave school seems therefore more accurate than assuming a linear relationship. This logistic regression is close to a least squares regression on aggregated data (see Appendix C). Moreover, we use retrospective information so year-cells corresponding to older

[9] We explore the alternative assumption that students can delay for two years, running estimations with two lags of unemployment. We also use the forward of unemployment as robustness checks assuming that students can advance their labor market entry for one year, see Table 3.

[10] More exactly, if students can only postpone one year, then β_1 is positive, if they postpone either one or two years, then β_1 would be a "mix" of the effects of $UR_{i,t-1}$ and $UR_{i,t-2}$. Note also that this model is equivalent to the following one:

$$P(L_{i,t}) = F(\alpha+(\beta_0+\beta_1).UR_t-\beta_1.(UR_t-UR_{t-1})+\gamma_1.t+\gamma_2.(t-\bar{T})\mathbb{1}_{t\geq\bar{T}}+\zeta_{16}.\mathbb{1}_{a=16}+...+\zeta_{24}.\mathbb{1}_{a=24})$$

Combining the coefficients of our model, one can therefore interpret the model in terms of level and variation of the unemployment rate.

years of analysis are over-represented in our sample. We weight data in order to give the same aggregated weight for each year-age cell *i.e.* for each unemployment-age cell.

We cluster standard errors at the year level to allow for intra-years correlations.

5 Results

We present the odds ratio both for the pooled and for the age per age models, see Table 1.

An odds ratio of 1 indicates that the probability of leaving school does not depend on unemployment. For the pooled regression model (all age-groups) as well as for age per age models, odds ratio of the current unemployment variable are lower than one. The odds ratio are significantly different from 1 at the 1% level for the pooled regression and 17-20 and 22 years old samples. They are significantly different from 1 at the 5% level for 16 and 23 years old samples. It seems therefore that, for each age-groups except for the 21 and 24 years old, when current unemployment increases, the probability of leaving school decreases. Interestingly, students who react the most to business cycle, *i.e.* younger students, are the more able to remain one more year at school, because there is no restriction for high-school or college enrollment in France.

We also compare the predicted probabilities of leaving school after a dramatic drop of the unemployment rate to 15% and a dramatic rise of the unemployment rate to 25%, in order to illustrate the size of the effect. More precisely, in both cases the past unemployment is set at 18% and the reference year at 2000. We therefore compare the effect of a decrease in unemployment from 18% to 15% and of a rise in unemployment from 18% to 25%. Results are almost identical whatever the baseline level of the unemployment rate.

For instance, 18 years old students have an estimated probability of 9.6% of leaving school when the young entrants unemployment rises to a very high level (25%), and a probability of 11.3% when unemployment drops to a very low level (15%) and the difference is statistically significant at a 1% level. However the effect is relatively weak whatever the age: the difference in probability between the two "extreme" levels of unemployment rate ranges from 1 to 3 percentage points across ages. In comparison, the structural increase in educational attainment between the mid-1980s and the mid-1990s decreased the probability to leave school at 18 years old by about 10 percentage points (see Figure 4 in appendix G).

Table 1: Logistic regression of the choice of leaving school on unemployment

Odd-ratio	16 years	17 years	18 years	19 years	20 years
15-24 years Unemployment	0.985**	0.968***	0.982***	0.986***	0.982***
	(0.006)	(0.009)	(0.006)	(0.005)	(0.005)
Lag of 15-24 years Unemployment	1.007	1.011	1.010	1.013**	1.017***
	(0.008)	(0.010)	(0.007)	(0.006)	(0.005)
trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1992	1991	1992	1993	1993
Predicted proport. of school-leavers (%)					
when unemployment rises	3.868	3.204	9.611	11.240	16.875
from 18% to 25% (1)	(0.140)	(0.218)	(0.315)	(0.370)	(0.425)
when unemployment drops	4.456	4.393	11.336	12.775	19.608
from 18% to 15% (2)	(0.148)	(0.155)	(0.289)	(0.270)	(0.412)
Diff. of proport. (2)-(1)	0.588**	1.189***	1.725***	1.535***	2.733***
	(0.237)	(0.322)	(0.579)	(0.576)	(0.715)
N	286270	260753	238637	190524	152679

Odd-ratio	21 years	22 years	23 years	24 years	All ages
15-24 years Unemployment	0.996	0.990***	0.987**	0.997	0.987***
	(0.006)	(0.003)	(0.005)	(0.007)	(0.004)
Lag of 15-24 years Unemployment	1.007	1.021***	1.010**	0.998	1.010**
	(0.005)	(0.004)	(0.005)	(0.007)	(0.004)
Spline	Yes	Yes	Yes	Yes	Yes
Estimated break	1993	2003	1999	1996	1991
Predicted proport. of school-leavers (%)					
when unemployment rises	19.798	22.889	29.849	37.386	
from 18% to 25% (1)	(0.639)	(0.480)	(0.752)	(1.100)	
when unemployment drops	20.374	24.751	32.742	38.099	
from 18% to 15% (2)	(0.424)	(0.367)	(0.502)	(0.768)	
Diff. of proport. (2)-(1)	0.576	1.861***	2.893**	0.714	
	(0.884)	(0.601)	(1.115)	(1.599)	
N	110994	80598	55629	35378	1411462

* p<0.10, ** p<0.05, *** p<0.01

Note: standard errors clustered at year-age level are in parenthesis.

Our regression yields another interesting result. The odds ratio of the lag of unemployment are always greater than one (except for 24 years old, non significant) and they are significant at a 5% level for pooled regression and for 19 and 23 years

old and at a 1% level for 20 and 22 years old. An increase in past unemployment rate therefore increases the probability of leaving school the year after, which is a result consistent with the existence of a selection effect: people having delayed their exit in the past are more likely to leave school in the current year.

Men and Women
We run separated regressions on men and women to test if there are differences in effects between sex. We find no differences, see Appendix E. This suggests that opportunity costs for men and women are decreasing in the same way for both sex during economic downturns.

Social background
We estimate our main model on two subsamples depending on father occupation: low social background vs high social background.[11] We find that students with a low social background react more to changes in unemployment rates, see Appendix F. In introduction, we presented the two potential effects of an increase in unemployment on school leaving decision: (1) decreasing opportunity costs of education entailing a lower school-leaving rate, (2) higher credit constraints entailing a higher school-leaving rate. Our results suggest that the first effect is stronger than the second one for both groups. Moreover, it seems that students with lower social background are more impacted by adverse economic conditions during economic downturns, entailing a higher decrease in opportunity costs of education. These results could be driven for a part by different scholar level and specialization depending on father occupation and correlated with a higher or lower probability to react to changes in unemployment rate. This is also in line with higher effects of business cycle on youngest students, as the unemployment rate of young entrants is stronger for the less educated ones.

6 Robustness checks

In this section, we show that our results are robust across four dimensions: (i) different period of analysis; (ii) the introduction of 0, 1 or 2 lags of unemployment and 0 or 1 forwards of unemployment as covariates; (iii) other unemployment rates as regressors; (iv) different weights and cluster schemes. We only show the results from the pooled regression (16-24 years old). Results for each age groups are qualitatively similar and available upon request from the authors.

[11] To be very accurate, to the attention of French readers, low social background corresponds to "ouvriers" (CS=6) and "employes" (CS=5), whereas high social background corresponds to "professions intermediaires (CS=4) and "cadres" (CS=3).

6.1 Different periods of time

We estimate our model on different periods of time, 1983-2009, 1990-2009 and 1995-2009, to show that our results are robust to the way we control for the rise in educational attainment that takes place between 1983 and 1995. Whatever the time period considered, results are qualitatively and quantitatively in line with our main specification: current unemployment has a negative effect on leaving school and past unemployment has a positive effect (Table 2, columns 4 and 5). Mechanically, results from the shorter observation windows are less precise. We now turn to the results on the 1983-2009 period without controlling by time trends or by forcing the time break at 1995, instead of 1991 (Table 2, columns 2 and 3). Current and lagged unemployment estimates have again the same sign as in the main specification (column 1), but insignificant when we do not control for time trends. Results by age-group – not displayed – are similar.

Table 2: Logistic regression of the choice of leaving school on unemployment (various periods, all ages)

Odd-ratio	1983-2009	1983-2009	1983-2009	1990-2009	1995-2009
15-24 years Unemployment	0.987***	0.990*	0.985	0.983***	0.987***
	(0.004)	(0.005)	(0.015)	(0.004)	(0.003)
Lag of 15-24 years Unemployment	1.010**	1.014**	1.005	1.013**	1.009*
	(0.004)	(0.005)	(0.016)	(0.005)	(0.005)
Trend	Yes	Yes	No	Yes	Yes
Break	1991	1995			

* p<0.10, ** p<0.05, *** p<0.01

Note: standard errors clustered at the year level are in parenthesis.

6.2 Adding lags and forwards of unemployment rate

Table 3 reports the estimates on the pooled sample for different specifications, with more or less lags and forwards of unemployment rate. Adding past unemployment increases the negative effect of current unemployment, confirming the potential downward bias if past unemployment is not included (see column (3) and (4)). When we include the secong lag of unemployment (see column (5)), the effect of the first lag is reduced and no more significant and the effect of the second lag is significant at a 5% level. This suggests that some students postpone their entry

by two years.

If students anticipate that economic conditions will remain bad in the future, they could stay at school (see column (1) and (2)). Estimated coefficients are in line with this anticipation effect (lesser than 1 and significant at a 5% level).

Table 3: Logistic regression of the choice of leaving school on unemployment (various lag or forward of unemployment, all ages)

Odd-ratio	1983-2009	1983-2009	1983-2009	1983-2009	1983-2009
Forward of 15-24 years Unemployment	0.991***	0.994*			
	(0.002)	(0.003)			
15-24 years Unemployment	0.998	0.992*	0.993**	0.987***	0.989***
	(0.002)	(0.005)	(0.003)	(0.004)	(0.004)
Lag of 15-24 years Unemployment		1.007		1.010**	1.005
		(0.005)		(0.004)	(0.005)
Lag 2 of 15-24 years Unemployment					1.006**
					(0.003)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1991	1991	1991	1991	1991

* p<0.10, ** p<0.05, *** p<0.01

Note: standard errors clustered at the year level are in parenthesis.

6.3 Other unemployment rates

We estimate the same model with different regressors (Table 4). Our principal regressor has the advantadge to be close to the labor market conditions of the young entrants but could be endogeneous. In fact, the decision to stay or not at school may influence the 15-24 years unemployment rate. We use the 25-49 years unemployment rate to be sure to have an exogenous regressor with the disadvantage that it is more distant from the labor market entry conditions of young people. We also use the unemployment rate of young entrants[12] (1-4 experienced year) to be closer to the labor market entry conditions. The three different unemployment indicators yield the same picture, qualitatively and quantitatively. Point

[12]The young entrants unemployment rate is not adjusted for the 2003 methodological break in calculating unemployment figures.

estimates using 15-24 years and 25-49 years unemployment rate are logically not identical because their scale of variations are not the same: when the 25-49 years unemployment rate increases by 1 point, the 15-24 unemployment rate increases by 3 points. The effects on the probability of leaving school of an increase of 1 point in the 25-49 years unemployment rate and of 3 points in the 15-24 years unemployment rate are indeed very close.

Table 4: Logistic regression of the choice of leaving school on unemployment (various unemployment rate, all ages)

Odd-ratio	UR 15-24 years	UR Young Entrants	UR 25-49 years
Unemployment	0.987***	0.990***	0.959***
	(0.004)	(0.002)	(0.010)
Lag of Unemployment	1.010**	1.013***	1.049**
	(0.004)	(0.003)	(0.013)
Trend	Yes	Yes	Yes
Estimated break	1991	1991	1991
N	1411462	1411462	1411462

* p<0.10, ** p<0.05, *** p<0.01

Note: standard errors clustered at the year level are in parenthesis.
Analysis period: 1983-2009

6.4 Different weighting schemes

We weighted our data at an age-year level in order to give the same weight to each birth cohort in the pooled regression. Without weights, we over-represent age-year cells for older years but if effects are quite homogenous across cohorts, non-weighted estimations should be close to weighted estimations. Results with or without weighted data are very similar, see Appendix D.

7 Conclusion

We find that the school-leaving age in France is endogenous to the business cycle, but the negative effect of unemployment on school leaving decision is quite small. Our results are consistent with the literature on other countries. Finding similar results for countries with very different educational system would favor the idea that most students have an education target level.

Our results suggest that many students do not have incentive to stay at school even if unemployment rate is very high. They know their scholar abilities and can anticipate if they will have success the coming year. If they cannot obtain a higher degree or use an additional education year to improve their productivity and their future wage, they will not benefit from staying one more year at school. The opportunity cost of one more education year is too high for them and they will prefer to enter into the labor market even if they are unemployed (because of professionalisation training process or help for job search).

Finally, since students react quite little to changes in economic conditions, comparing cohorts of young people entering into the labor market in different economic conditions without controlling for selection is thus not likely to induce bias in estimations comparing labor market entry cohorts (see Appendix G for more details).

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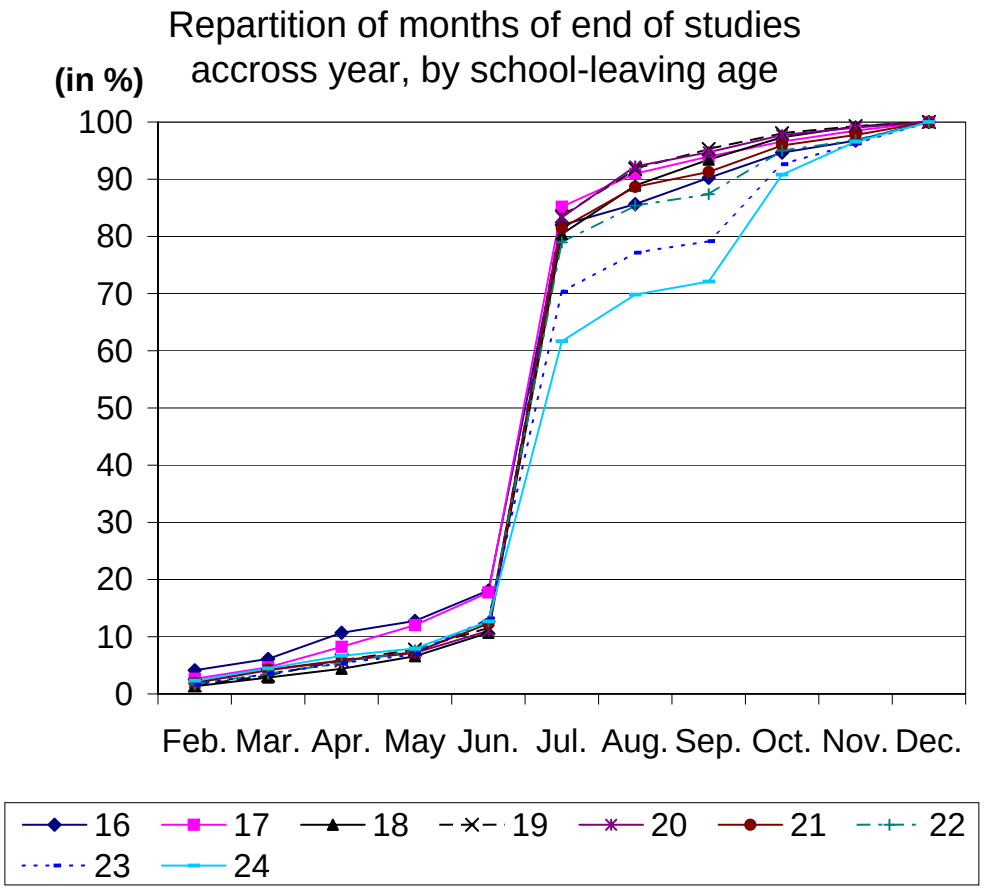
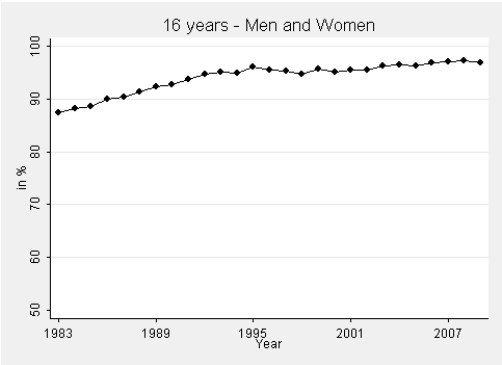
A Appendix: Most students leave school during the third quarter



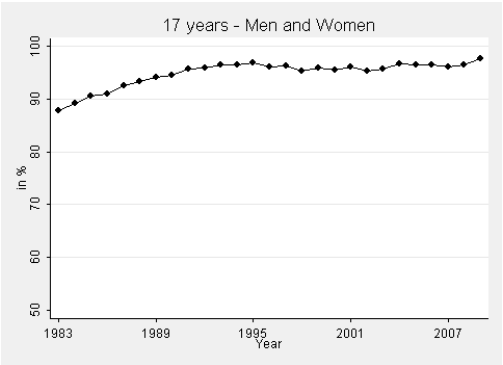
Source: "Generation" Survey Cereq, 1998

B Appendix: Retention rate

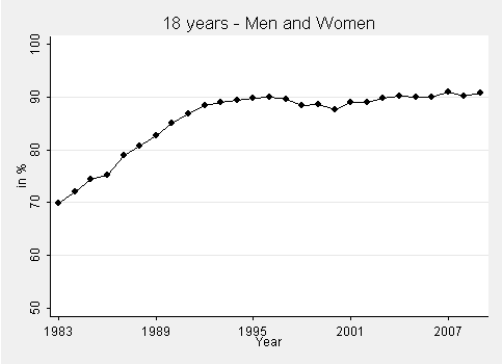
Figure 2: Probability of completing one more year of schooling



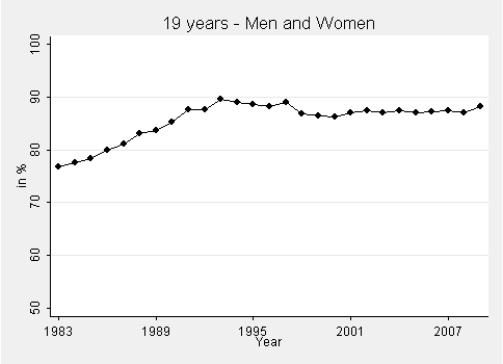
(a) 16 years



(b) 17 years



(c) 18 years



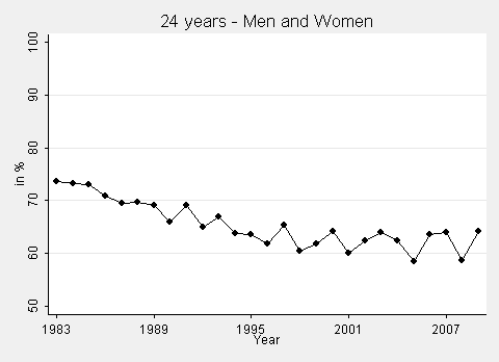
(d) 19 years

(e) 20 years

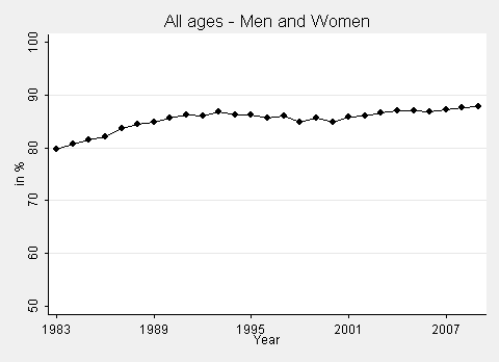
(f) 21 years

(g) 22 years

(h) 23 years



(i) 24 years



(j) All ages

C Appendix: Main model with aggregated data

Table 5: OLS regression of the choice of leaving school on unemployment (aggregated data)

	16 years	17 years	18 years	19 years	20 years
15-24 years Unemployment	-0.042	-0.121***	-0.131**	-0.134*	-0.283***
	(0.038)	(0.041)	(0.063)	(0.068)	(0.084)
Lag of 15-24 years Unemployment	0.008	0.019	0.069	0.148**	0.264***
	(0.039)	(0.042)	(0.064)	(0.070)	(0.086)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1992	1991	1992	1993	1993
Predicted proport. of school-leavers (%)					
when unemployment rises	4.002	3.141	9.729	11.240	16.778
from 18% to 25% (1)	(0.253)	(0.275)	(0.420)	(0.459)	(0.565)
when unemployment drops	4.421	4.354	11.039	12.575	19.608
from 18% to 15% (2)	(0.174)	(0.189)	(0.290)	(0.318)	(0.392)
Diff. of proport. (2)-(1)	0.419	1.213***	1.310**	1.335*	2.830***
	(0.377)	(0.412)	(0.627)	(0.683)	(0.841)
N	27	27	27	27	27

	21 years	22 years	23 years	24 years	All years
15-24 years Unemployment	-0.057	-0.185**	-0.283**	-0.061	-0.184
	(0.099)	(0.089)	(0.121)	(0.175)	(0.327)
Lag of 15-24 years Unemployment	0.124	0.388***	0.204	-0.045	0.144
	(0.102)	(0.089)	(0.125)	(0.182)	(0.333)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1993	2003	1999	1996	
Predicted proport. of school-leavers (%)					
when unemployment rises	19.792	22.878	29.863	37.376	
from 18% to 25% (1)	(0.667)	(0.652)	(0.924)	(1.213)	
when unemployment drops	20.361	24.727	32.697	37.984	
from 18% to 15% (2)	(0.463)	(0.418)	(0.605)	(0.840)	
Diff. of proport. (2)-(1)	0.569	1.849**	2.834**	0.608	
	(0.993)	(0.887)	(1.211)	(1.749)	
N	27	27	27	27	243

* p<0.10, ** p<0.05, *** p<0.01

D Appendix: Main model with non-weighted data

Table 6: Logistic regression of the choice of leaving school on unemployment (non-weighted data)

Odd-ratio	16 years	17 years	18 years	19 years	20 years
15-24 years Unemployment	0.986***	0.977***	0.982***	0.987***	0.982***
	(0.005)	(0.008)	(0.006)	(0.005)	(0.005)
Lag of 15-24 years Unemployment	1.009	1.007	1.012*	1.014***	1.014***
	(0.007)	(0.008)	(0.006)	(0.005)	(0.005)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1992	1991	1992	1993	1993
Predicted proport.					
of school-leavers (%)					
when unemployment rises	3.904	3.454	9.620	11.402	17.024
from 18% to 25% (1)	(0.136)	(0.193)	(0.350)	(0.341)	(0.482)
when unemployment drops	4.482	4.320	11.359	12.812	19.740
from 18% to 15% (2)	(0.141)	(0.159)	(0.262)	(0.252)	(0.381)
Diff. of proport. (2)-(1)	0.578***	0.866***	1.740***	1.410***	2.716***
	(0.205)	(0.298)	(0.558)	(0.512)	(0.746)
N	286270	260753	238637	190524	152679

Odd-ratio	21 years	22 years	23 years	24 years	All ages
15-24 years Unemployment	0.991*	0.992**	0.990**	0.998	0.985***
	(0.005)	(0.004)	(0.005)	(0.007)	(0.004)
Lag of 15-24 years Unemployment	1.011**	1.019***	1.005	0.998	1.009**
	(0.004)	(0.005)	(0.005)	(0.007)	(0.004)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1993	2003	1999	1996	1991
Predicted proport.					
of school-leavers (%)					
when unemployment rises	19.286	23.146	30.372	37.527	
from 18% to 25% (1)	(0.528)	(0.533)	(0.752)	(1.104)	
when unemployment drops	20.719	24.657	32.503	37.966	
from 18% to 15% (2)	(0.391)	(0.410)	(0.445)	(0.761)	
Diff. of proport. (2)-(1)	1.434*	1.511**	2.131**	0.440	
	(0.763)	(0.725)	(0.998)	(1.593)	
N	110994	80598	55629	35378	1411462

* p<0.10, ** p<0.05, *** p<0.01

Note: standard errors clustered at the year level are in parenthesis.

E Appendix: Results by sex

Table 7: Men: Logistic regression of the choice of leaving school on unemployment

Odd-ratio	16 years	17 years	18 years	19 years	20 years
15-24 years Unemployment	0.985**	0.970***	0.987*	0.988*	0.985***
	(0.007)	(0.009)	(0.007)	(0.007)	(0.006)
Lag of 15-24 years Unemployment	1.010	1.014	1.002	1.009	1.020***
	(0.009)	(0.010)	(0.007)	(0.007)	(0.005)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1992	1991	1992	1993	1993
Predicted proport.					
of school-leavers (%)					
when unemployment rises	4.421	3.671	11.734	12.877	18.457
from 18% to 25% (1)	(0.213)	(0.246)	(0.441)	(0.458)	(0.601)
when unemployment drops	5.129	4.897	13.105	14.262	20.908
from 18% to 15% (2)	(0.186)	(0.189)	(0.393)	(0.410)	(0.520)
Diff. of proport. (2)-(1)	0.708**	1.226***	1.371*	1.385*	2.451***
	(0.326)	(0.367)	(0.750)	(0.814)	(0.919)
N	141215	127351	115520	89850	71189

Odd-ratio	21 years	22 years	23 years	24 years	All ages
15-24 years Unemployment	0.999	0.989	0.985**	1.002	0.989**
	(0.007)	(0.007)	(0.007)	(0.010)	(0.004)
Lag of 15-24 years Unemployment	1.003	1.027***	1.016**	0.989	1.010**
	(0.007)	(0.007)	(0.008)	(0.012)	(0.004)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1993	2003	1999	1996	1991
Predicted proport.					
of school-leavers (%)					
when unemployment rises	20.827	22.729	28.729	37.996	
from 18% to 25% (1)	(0.728)	(1.001)	(1.133)	(1.569)	
when unemployment drops	21.056	24.662	32.031	37.457	
from 18% to 15% (2)	(0.638)	(0.489)	(0.643)	(0.916)	
Diff. of proport. (2)-(1)	0.229	1.932	3.301**	-0.539	
	(1.133)	(1.271)	(1.460)	(2.238)	
N	51108	37140	25945	16840	676158

* p<0.10, ** p<0.05, *** p<0.01

Note: standard errors clustered at the year level are in parenthesis.

Table 8: Women: Logistic regression of the choice of leaving school on unemployment

Odd-ratio	16 years	17 years	18 years	19 years	20 years
15-24 years Unemployment	0.987**	0.965***	0.974***	0.982**	0.979***
	(0.006)	(0.010)	(0.007)	(0.007)	(0.007)
Lag of 15-24 years Unemployment	1.003	1.008	1.020***	1.017**	1.013**
	(0.008)	(0.011)	(0.008)	(0.008)	(0.007)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1992	1991	1992	1993	1993
Predicted proport. of school-leavers (%)					
when unemployment rises	3.311	2.749	7.596	9.729	15.487
from 18% to 25% (1)	(0.116)	(0.212)	(0.337)	(0.493)	(0.630)
when unemployment drops	3.762	3.888	9.628	11.443	18.452
from 18% to 15% (2)	(0.155)	(0.141)	(0.287)	(0.263)	(0.563)
Diff. of proport. (2)-(1)	0.451**	1.139***	2.032***	1.713**	2.965***
	(0.225)	(0.300)	(0.560)	(0.645)	(1.045)
N	145055	133402	123117	100674	81490

Odd-ratio	21 years	22 years	23 years	24 years	All ages
15-24 years Unemployment	0.994	0.990	0.989	0.993	0.985***
	(0.008)	(0.009)	(0.007)	(0.014)	(0.004)
Lag of 15-24 years Unemployment	1.011*	1.017*	1.004	1.005	1.010**
	(0.007)	(0.009)	(0.007)	(0.013)	(0.004)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1993	2003	1999	1996	1991
Predicted proport. of school-leavers (%)					
when unemployment rises	18.904	23.025	30.823	36.904	
from 18% to 25% (1)	(0.933)	(1.096)	(1.137)	(1.964)	
when unemployment drops	19.841	24.839	33.290	38.486	
from 18% to 15% (2)	(0.465)	(0.751)	(0.585)	(1.561)	
Diff. of proport. (2)-(1)	0.937	1.814	2.467	1.583	
	(1.262)	(1.614)	(1.526)	(3.230)	
N	59886	43458	29684	18538	735304

* p<0.10, ** p<0.05, *** p<0.01

Note: standard errors clustered at the year level are in parenthesis.

F Appendix: Results by father occupation

Table 9: Father with a low social background: Logistic regression of the choice of leaving school on unemployment

Odd-ratio	16 years	17 years	18 years	19 years	20 years
15-24 years Unemployment	0.983**	0.959***	0.980***	0.980***	0.982**
	(0.008)	(0.013)	(0.006)	(0.008)	(0.008)
Lag of 15-24 years Unemployment	1.007	1.014	1.010	1.013*	1.017**
	(0.009)	(0.012)	(0.006)	(0.008)	(0.007)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1992	1991	1992	1993	1993
Predicted proport. of school-leavers (%)					
when unemployment rises	5.072	4.160	13.307	15.205	22.971
from 18% to 25% (1)	(0.218)	(0.459)	(0.457)	(0.709)	(0.962)
when unemployment drops	5.948	6.216	15.760	17.942	26.289
from 18% to 15% (2)	(0.253)	(0.254)	(0.378)	(0.408)	(0.623)
Diff. of proport. (2)-(1)	0.876**	2.056***	2.453***	2.737***	3.318**
	(0.441)	(0.610)	(0.779)	(1.033)	(1.407)
N	142085	126394	113329	84431	63624

Odd-ratio	21 years	22 years	23 years	24 years	All ages
15-24 years Unemployment	0.994	0.995	0.993	0.974	0.983***
	(0.007)	(0.005)	(0.008)	(0.016)	(0.004)
Lag of 15-24 years Unemployment	1.010	1.017**	0.998	1.022	1.012**
	(0.006)	(0.007)	(0.008)	(0.014)	(0.005)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1993	2003	1999	1996	1991
Predicted proport. of school-leavers (%)					
when unemployment rises	26.320	28.740	34.913	35.666	
from 18% to 25% (1)	(0.936)	(0.895)	(1.419)	(2.298)	
when unemployment drops	27.411	29.863	36.596	41.807	
from 18% to 15% (2)	(0.689)	(0.512)	(0.760)	(1.760)	
Diff. of proport. (2)-(1)	1.091	1.123	1.683	6.141	
	(1.380)	(1.116)	(1.758)	(3.776)	
N	41772	27782	17805	10813	628035

* p<0.10, ** p<0.05, *** p<0.01

Note: standard errors clustered at the year level are in parenthesis.

Table 10: Father with a high social background: Logistic regression of the choice of leaving school on unemployment

Odd-ratio	16 years	17 years	18 years	19 years	20 years
15-24 years Unemployment	0.993	0.976**	0.990	1.006	0.979***
	(0.009)	(0.011)	(0.010)	(0.007)	(0.006)
Lag of 15-24 years Unemployment	1.009	1.020*	1.005	0.994	1.022***
	(0.013)	(0.012)	(0.010)	(0.009)	(0.006)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1992	1991	1992	1993	1993
Predicted proport. of school-leavers (%)					
when unemployment rises	1.165	1.158	4.349	6.268	9.147
from 18% to 25% (1)	(0.086)	(0.086)	(0.345)	(0.281)	(0.367)
when unemployment drops	1.249	1.471	4.776	5.951	11.120
from 18% to 15% (2)	(0.079)	(0.081)	(0.135)	(0.208)	(0.277)
Diff. of proport. (2)-(1)	0.084	0.312**	0.426	-0.317	1.973***
	(0.103)	(0.143)	(0.424)	(0.394)	(0.536)
N	84799	80137	75144	65908	56652

Odd-ratio	21 years	22 years	23 years	24 years	All ages
15-24 years Unemployment	1.001	0.986	1.001	1.007	0.996
	(0.004)	(0.009)	(0.007)	(0.007)	(0.004)
Lag of 15-24 years Unemployment	1.005	1.023***	1.004	0.993	1.006
	(0.005)	(0.008)	(0.008)	(0.006)	(0.004)
Trend	Yes	Yes	Yes	Yes	Yes
Estimated break	1993	2003	1999	1996	1991
Predicted proport. of school-leavers (%)					
when unemployment rises	12.315	17.028	28.096	37.211	
from 18% to 25% (1)	(0.347)	(0.862)	(0.898)	(1.274)	
when unemployment drops	12.163	19.054	27.925	35.632	
from 18% to 15% (2)	(0.241)	(0.536)	(0.718)	(0.492)	
Diff. of proport. (2)-(1)	-0.152	2.027	-0.171	-1.580	
	(0.465)	(1.267)	(1.314)	(1.508)	
N	45919	36192	26634	17468	488853

* p<0.10, ** p<0.05, *** p<0.01

Note: standard errors clustered at the year level are in parenthesis.

G Appendix: Countercyclical leaving-school decisions and selection in labor market outcomes

We have studied so far the effect of the economic situation (unemployment rate) on the probability of leaving school. We have shown that the probability of leaving school is slightly contra-cyclical. Now we investigate how this cyclical pattern affects the labor market outcomes of a school leaving-year cohort (people who leave school during the same year). This is a main issue for empirical identification strategies relying on labor market comparisons.

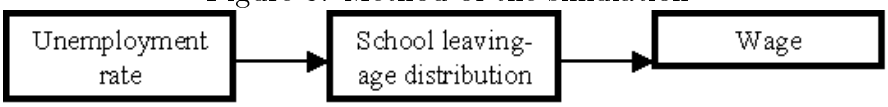
Can we compare directly two cohorts of school-leavers who faced different economic conditions at their entry into the labor market? This is of primary interest for empirical work aiming at measuring the so-called *scarring effect*: *i.e.*, how much income will one lose when she completes a degree during an economic crisis? If the school-leaving age and year are endogenous to business cycle, we cannot directly compare cohorts (and thus employment prospects). If not treated, this endogeneity could lead to an underestimation of the scarring effect but we find that this bias is very low in the French case.

To do so, we use the results of our main model (see Table 2).

We proceed in two steps (see Figure 3):

1. In a first step, we use our estimates to study how the school-leaving age distribution moves with the business cycle, from 1983 to 2009.
2. In a second step, we simulate changes in mean wage entailed by these changes in the school-leaving age distribution (under the assumption that mean wage for a given school leaving age does not vary).

Figure 3: Method of the simulation



This method is clearly crude and wages of students anticipating or postponing their school-leaving are likely to be different from wages of other students. Yet, this method gives some hints about the magnitude of the effect. We find that the difference in the wages paths is very weak (not more than 15 euros of monthly wage from one year to the following).

Unemployment therefore affects school-leaving age distribution, which mechanically entails a change in new entrants mean wage path. Yet, as suggested in this appendix, unemployment effects on school leaving-age distribution are quite small.

G.1 Method

Probability of leaving school at each age and year Recall that our main model has the following form ($F(.)$ being the logistic cdf):

$$P(L_{i,a,t}) = F(\alpha_a + \beta_{0_a}.UR_t + \beta_{1_a}.UR_{t-1} + \gamma_{1_a}.t + \gamma_{2_a}.(t - \bar{T}_a)\mathbb{1}_{t \geq \bar{T}_a})$$

Let's define p_a^t as the probability of leaving school at age a during the year t, netted out from the effect of the structural evolution of the school leaving age. To do so, we predict $\hat{p}_a^t$ using unemployment rates of year t and $t-1$ but we fix the year at 2000 for the trend evolutions. The evolution of $\hat{p}_a^t$ over time is thus only driven by the evolution of the unemployment rate. Formally :

$$\hat{p}_a^t = F(\hat{\alpha}_a + \hat{\beta}_{0_a}.UR_t + \hat{\beta}_{1_a}.UR_{t-1} + \hat{\gamma}_{1_a}.2000 + \hat{\gamma}_{2_a}.(2000 - \bar{T}_a)\mathbb{1}_{2000 \geq \bar{T}_a}) \quad \text{(G.1)}$$

Number of students by age: baseline We use as baseline for the repartition of students across ages the repartition derived from our main model in 2000, see table 11. We normalize the number of students at age 16 to 100. We note N_a the normalized number of students at age a.

Table 11: Number of students by age, year 2000 (normalized at 100 at age 16)

Age	N
16	100
17	96
18	92
19	82
20	72
21	59
22	47
23	36
24	25

School leaving-age distribution In this simulation, we are interested in the effect of unemployment on the school leaving age distribution. We apply to our baseline distribution of students the predicted probabilities of leaving school for each year and each age ($p_a^t, 16 \leq a \leq 24, 1983 \leq t \leq 2009$). We obtain the number of students leaving school each year for each age. For each year, we divide the number of students with the same school-leaving age by the total number of students leaving-school that same year. We obtain the share of each age group among the leaving-school students for each year.

$$\hat{\pi}_a^t = \frac{\hat{p}_a^t.N_a}{\sum_\alpha \hat{p}_\alpha^t.N_\alpha} \tag{G.2}$$

Wage evolution due to the cyclicality of the school leaving-age We run a log linear regression to estimate the effect of the school leaving age on earnings, after 1 year and after 5 years of potential experience ($1990 \leq t \leq 2009$)[13]:

$$log(w_{it}^e) = \alpha^e + \beta^e.a_{it} + \eta_t^e + \epsilon_{it}^e \tag{G.3}$$

We deduce from this regression the mean wage - $\hat{W}_a$ - for each school leaving-age a: $\hat{W}_a = exp(\hat{\alpha} + \hat{\beta}.a).exp(\hat{\sigma}^2/2)$ (after 1 or 5 years) with $\hat{\sigma}$ the estimated standard-error of ϵ_{it}.

We then compute the mean wage for the school leavers of year t: $\hat{W}_t = \sum_{a=16}^{24} \hat{\pi}_a^t.\hat{W}_a$.

G.2 Results

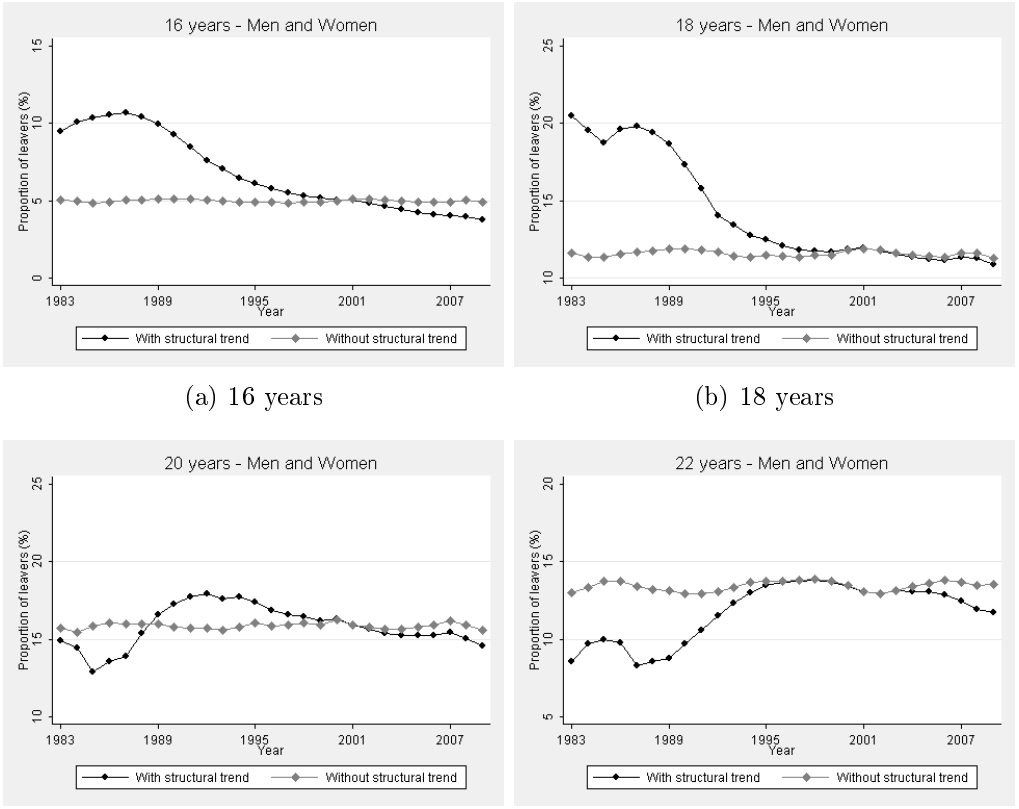
We find that changes in the unemployment rate imply very weak variations in the school-leaving age distribution during the period 1983-2009. Figure 4 displays the annual evolution of the share of school-leavers of each age (year 2000). According to our results, the predicted percentage of school leavers aged between 16 and 24 reacts very slightly to the business cycle. For comparison, we represent also the evolution of the percentage of school leavers taking into account the structural trend.

The reasons explaining why this variations are so weak are threefold. First, the estimated effects of unemployment rate on school leaving age are significant but weak. For each age, the current unemployment rate has a weak effect on the predicted probability of leaving school. The effect on the school leaving age distribution is consequently weak. Second, a high unemployment level causes students

[13] We use the 1990-2009 period because we do not have wages in our dataset before 1990.

to stay at school at every age (although with an heterogeneous intensity), so that the business cycle affects more the number of school leavers than the distribution or mean of the school leaving-age. Third, the current and past unemployment rates play in opposite directions on the probability of leaving school. The viscosity of business cycle therefore causes only a small change in the school leaving age.

Figure 4: Simulations: Annual evolutions of the share of each age group among the school leavers and mean school leaving age, French case, year 1983-2009

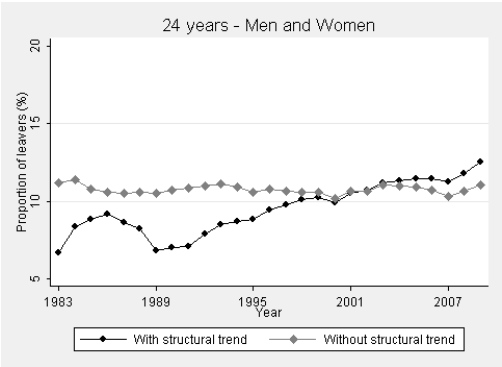


(a) 16 years

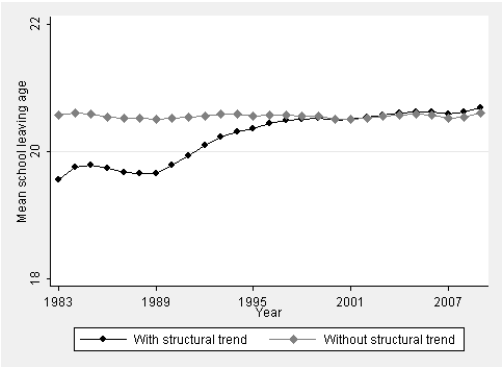
(b) 18 years

(c) 20 years

(d) 22 years



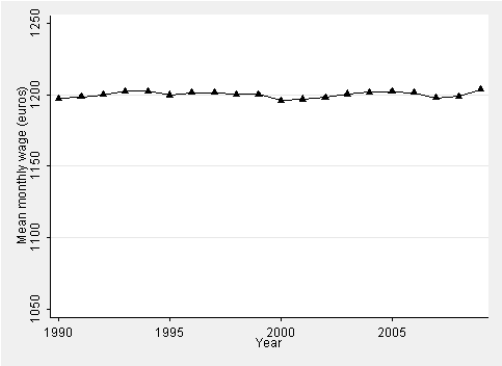
(e) 24 years



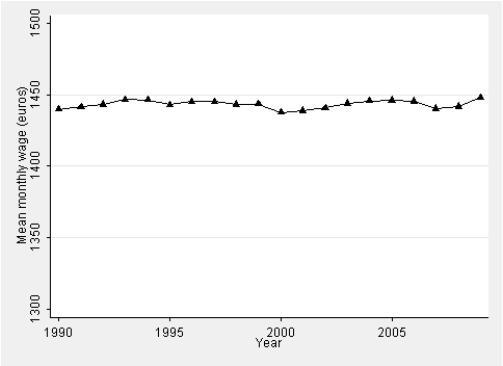
(f) Mean age

Note: confidence intervals are not calculated.

Figure 5: Simulations: Annual evolutions of the mean wage due to the impact of unemployment rate on school-leaving age distribution, French case, year 1990-2009



(a) 1 potential experience year



(b) 5 potential experience year

Note: confidence intervals are not calculated. The mean monthly wage is calculated on full-time jobs

Using the school-leaving age distribution we compute the mean wage for one years and five years of potential experience, from 1990 to 2009 and for full-time workers (see Figure 5). We find that the differences in the wages paths are very weak (not more than 15 euros in monthly wage between 2 years, i.e. about 1% of mean wage).

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