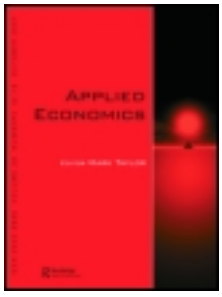

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Does student employment really impact academic achievement? The case of France

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Does student employment really impact academic achievement? The case of France

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Student employment is usually thought to curb academic achievement. Our research relating to a survey at a French university in 2012 emphasizes the significance of the intensity of student working hours. Allowance for the endogeneity of student employment reinforces the negative effects, particularly for young people working more than 16 hours a week. However, the academic achievement of those working fewer than 8 hours per week seems unaffected. The type of employment also affects the chances of success: students with public sector jobs appear to be less prone to failure, possibly because of more flexible working hours.

Keywords: student employment; academic achievement; bivariate probit; treatment effect

JEL Classification: I20; J22; J24

I. Introduction

In France, about one student in five leaves higher education with no qualifications. Although a somewhat lower rate than in many OECD countries, this is because failing university students are redirected towards shorter higher educational courses. Within universities, holding down a job while studying is often pointed to as a cause of failure and gradual dropout (Pinto, 2010; Beffy *et al.*, 2013). Jobs compete with study time, supposedly reducing academic effort and achievement. Although France, with 50% of students working, is in an intermediate position in Europe between the northern countries where a high proportion of students are in employment and the southern countries where such employment is less developed, it is also characterized by a higher volume of casual jobs that are related little if at all to the course of studies, according to Eurostudent data.[1] Yet research into the connection between student employment and academic achievement shows that activities that compete with education are often associated with a high risk of failure at school or university (Ehrenberg and Sherman, 1987; McNeal, 1997; Brint and Cantwell, 2010).

Students face the question of the cost–benefit ratio of taking up employment while still in education. While such employment provides a nonnegligible source of income with which to finance, at least partially, their higher education, it is also thought to be one of the leading causes of academic failure. As Eckstein and Wolpin (1999) hypothesize, employment is liable to reduce the effort

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[1] *Eurostudent* data are used as part of a European programme to collect data through national surveys of the welfare and living conditions of students that are comparable across participating countries. They reveal, for example, the diversity of work–study situations in Europe; in Denmark almost two out of three students work compared with just one in three in southern European countries like Spain and Italy.

put into studying, which may heighten the risk of repeating a year or of dropping out. Other research, however, underscores the positive effect of student jobs on future professional income (Light, 1998; Molitor and Leigh, 2005): they provide students with work experience, which they are often criticized for not having when they join the labour market after graduating. The characteristics of the type of employment seem decisive in both cases. Surveys of student living conditions in France emphasize the extreme diversity of paid employment during higher education (Gruel and Tiphaine, 2004): they cover a variety of situations in terms of intensity, regularity or types of employment, the consequences of which are often complex (Béduwé and Giret, 2004).

The primary objective of our research will be to take account of this variety of effects of student employment on academic achievement, endogenously. Just one study using French data, by Beffy *et al.* (2009, 2013), has taken into account the endogenous nature of work during higher education to test the impact of such employment on the success of students in French universities between 1992 and 2002. It emphasized especially the highly negative effect of full-time paid employment on the chances of success at university. For the more than 10 years since then, it can be wondered what the repercussions of student employment have been on university success. For one thing, the economic crisis may have deteriorated student's living conditions and compelled them to look for jobs to pay for their education. For another thing, the presence of new student audiences at university, such as vocational secondary school diploma holders, whose academic level is lower, is liable to worsen the effects of student employment on achievement. In our research, we propose to study the consequences of paid employment for students based on a survey of student employment conducted at a French university in 2012.

This work is subdivided into five sections. The first section summarizes the main lessons from a review of the literature on the relationship between student employment and academic achievement. The second section presents the survey used in this research and the descriptive statistics associated with employment. The third section details the econometric modelling used, in particular for taking account of the endogeneity of student employment. The fourth section sets out the main findings and the fifth section concludes the study by looking at its implications, notably for policy on student life.

II. Student Employment and Academic Achievement: Lessons from the Literature

In terms of theory, student arbitrage in allocating their time is assumed to have a decisive effect on academic productivity and in explaining their success or failure (Becker, 1982; Levin and Tsang, 1987). Such choices depend not only on how much individuals value their studies but also on their observable (previous academic level) or less readily observable (e.g. level of effort) abilities. The decision to work while in education will therefore result from arbitrage among the different opportunities and constraints students may have with respect to these separate activities. Students may allot their time to leisure or rest, to paid work or to academic study, the latter being generally decisive for success. One of the central issues in understanding the effects of student employment on academic achievement is to determine whether having a job will reduce leisure time, rest time or personal study time. Oosterbeek and van den Broek (2009) indicate, for example, that substitutability between study time and paid work time is relatively low when other types of financing arise; Dutch students cut down the time spent on paid labour but they only very marginally change the time reserved for study. In other words, the choice is primarily between study time and leisure time. Kalenkoski and Pabilonia (2012) report that US high-school students who have jobs cut down on homework time but even more so on time for leisure activities, such as watching television. However, rest time during school terms is not affected. Ruhm (1997), taking up earlier work, reports that working 20 hours per week for final-year high-school students reduces weekly study time by about 7 minutes, but cuts time watching television by nearly 4 hours. However, it is not obvious that this substitutability between employment time and leisure time is the same for all students. In France, Lévy-Garboua (1976) observed that this substitutability between employment time and leisure time was high above all for the students from wealthier family with higher socio-economic status. Notably, he showed that when the expected returns to higher education decline on the labour market, students from more privileged backgrounds give precedence to access to employment during their education at the expense of their leisure time when it comes to choosing between present and future income.

Empirical work on the repercussions of student employment on achievement plead for the importance of the threshold effect in the intensity of student work in secondary and higher education alike. One of the problems, though, is the endogeneity of the number of hours which results, as seen, from the student's decision. Stinebrickner and Stinebrickner (2003) emphasize the need to correct this bias, while the use of OLS method might lead to results that differ greatly from those found by fixed-effects or instrumental variable methods. Using simultaneous equations, Beffy *et al.* (2009) show that working for more than 16 hours per week seriously jeopardizes the probability of graduating from higher education in France (on average by 49 percentage points). However, when less than 16 hours per week are worked, the effect is halved and is only significant at 10% (on average 28 percentage

points). Other studies conclude that a small number of hours' employment has no significant effect on attainment, as shown, for example, by Buscha *et al.* (2012) for US high schools by a method combining propensity scores and differences of differences. Montmarquette *et al.* (2007) claim that the effect of employment for Canadian high-school students is not virtually negative any more when kept to less than 15 hours per week. The findings of Ehrenberg and Sherman (1987) on US higher education are similar but for a higher threshold, below 25 hours per week, employment time does not seem to have a negative effect on student's grades. Lastly, some research concludes that there is even a positive effect of a few hours' work on academic achievement whereas exceeding the threshold of 15 hours per week invariably has a negative impact (D'Amico, 1984; Lillydahl, 1990). This positive effect, which may be explained by greater motivation, remains significant even when Lillydahl (1990) uses an instrumental variable method to correct for bias.

The number of hours students spend in employment is not the only employment characteristic liable to influence academic achievement. It may be thought that certain activities during some time slots, such as night-time working, may be more detrimental. For the same number of hours worked, McNeal (1997) shows that certain types of student jobs in industry, for example, may have far greater adverse effects on academic achievement. Other research separates paid activities on and off campus. The effect of the latter is systematically negative while the effect of the former is rather positive or neutral (Ehrenberg and Sherman, 1987; Brint and Cantwell, 2010). First, on-campus activities are a means of social and cultural integration of students in the university environment, which may facilitate success. Second, even when the on-campus activities are unrelated to their studies, students have the possibility of negotiating with their employer for more flexible working hours to allow for their educational constraints. Lastly, as Meng and Heijke (2005) point out, jobs related to studies are a chance to acquire special or even general skills that may facilitate academic achievement if the time constraint is not excessive.

All told, these different studies show that the consequences of working while in education, although generally unfavourable for students, may be less clear-cut in some instances. Short working hours and certain types of employment may actually increase the chances of success or at least not lower them.

III. Data

In order to test the different effects of paid work on academic achievement, we work on a sample of 823 students at the University of Poitiers. The data were collected from a survey conducted in the final term of 2012. The questionnaire was administered electronically to students doing scientific (applied fundamental sciences), literary (literature and language) and social studies in the broad sense (human and social sciences, as well as economics, law and economic and social administration). Only students already registered at the university in their second (L2) or third (L3) undergraduate years in 2011–2012 were selected for our investigation. Some 50 questionnaires were removed because the key variables associated with paid employment were not correctly completed (failure to answer questions characterizing the job) or corresponded to compulsory placements included in course work, which are excluded from our analysis. Some 26.4% of the sample said they had been in employment while in education in the course of the academic year (cf. Table A1, Appendix 1). In all, 89.4% of students passed their academic year, although the figures were slightly more than 90% for students not in employment versus 85.7% for students who had jobs,[2] which seems to indicate an adverse effect of student employment taken overall. The differences between students who work and the others are quite marked, though. Those in employment are more often

Table 1. Descriptive statistics associated with success and student salaried employment

	All students questioned	Students not in employment in previous year	Students in employment during previous year
Numbers	823	606	217
Academic achievement			
Passed all final year	89.4%	90.8%	85.7%
Passed one semester only	6.3%	5.5%	8.8%
Passed neither semester	4.2%	4.0%	5.5%
In salaried employment: Yes	26.4%	0%	100%
Casual	8.6%		32.7%
Public sector	3.3%		12.4%
Private sector	14.5%		54.8%
Less than 8 hours per week	5.2%		19.8%
8 to 16 hours per week	12.9%		48.8%
More than 16 hours per week	8.3%		31.3%

Source: Personal survey.

[2] These proportions are significantly different (equal proportions rejected for a 5% tolerance level).

third-year undergraduates and are on human sciences, arts or literature and language courses. They are also less often financially dependent on their parents, although they are slightly more often the offspring of managerial grade parents (Table A1, Appendix 1).

One of the useful points of the survey is that it provides information about the number of hours worked per week and about the type of employment. Almost half of the students in employment work between 8 and 16 hours per week, slightly less than one-third exceed 16 hours per week, whereas one in five works less than 8 hours per week. Most jobs are in the private sector (54.8%), mainly salaried employment, such as shop assistants or in catering; then come casual jobs (babysitting, homework support, gardening). Public sector jobs make up just 12.4% of the total. They are often as supervisors in middle or high schools.

IV. Models

The review of the literature presented in the first section emphasizes the need to take account of the endogeneity of student work. The decision to work during education results from different observed and unobserved variables that may affect academic achievement. These include, for example, the liking for study, career plan or motivation that may influence in the same or opposing directions academic achievement and employment while in education. The econometric models to be estimated are probit models with two simultaneous equations. The first equation will explain salaried employment and the second success in end of academic year examinations. Identification of these models presupposes the presence of instrumental variables. These instruments must influence the decision about working while in education but not academic achievement. In our data, the student's life style – living alone or at parents' home – affects the probability of working while in education but has no impact on academic achievement. Students who do not live at their parents' home have generally attended secondary school in the same region as the other students but in towns further away from the university city. They have the opportunity of renting accommodation on the university campus at a relatively low rate or of renting private accommodation. Other variables such as the social category of parents, financial support or nationality influence whether or not they are in employment but do not significantly affect academic achievement. This finding may seem surprising but can be explained by the forms of selection in France during their schooling, especially at high school and then upon entering higher education, which socially structure and homogenize their academic careers. Social category is used as an instrument by Beffy *et al.* (2009), who observe no linkage between this variable and achievement.

Modelling employment and achievement from a simple bivariate probit model

Initially, being in employment that is not a course requirement and during academic year is characterized by a dichotomous variable *E,* which takes the value 1 if the student is in employment and 0 otherwise.[3] More specifically, the decision to take up employment ($E = 1$) is determined by the latent variable $E^* = X_E\beta_E + u_E$ positive. This variable depends on observed exogenous individual characteristics X_E (β_E is the vector of parameters to be estimated that are associated with these characteristics) and on a random measurement error u_E, which is supposed to follow a normal standard distribution.

Passing the academic year is characterized by the dichotomous variable *Y,* which takes the value 1 if the student passes the year and 0 else. More specifically, the student passes the year if the associated latent variable $Y^* = E\gamma + X_Y\beta_Y + u_Y$ is positive whereas it is negative if one or both semesters are failed. This latent variable is dependent on being a student in employment (E), a potentially endogenous variable (γ is the parameter to be estimated associated with employment), a set of exogenous individual characteristics X_Y (β_Y is the vector of parameters to be estimated) and a random error term u_Y, which is supposed to follow a normal standard distribution. The two measurement error terms are assumed to be correlated (σ_{EY}). There are therefore four likelihood contributions:

$$\begin{aligned} P(E=1,Y=1) &= \Phi_2(X_E\beta_E, \gamma + X_Y\beta_Y, \sigma_{EY}) \\ P(E=1,Y=0) &= \Phi_2(X_E\beta_E, -\gamma - X_Y\beta_Y, -\sigma_{EY}) \\ P(E=0,Y=1) &= \Phi_2(-X_E\beta_E, X_Y\beta_Y, -\sigma_{EY}) \\ P(E=0,Y=0) &= \Phi_2(-X_E\beta_E, -X_Y\beta_Y, \sigma_{EY}) \end{aligned}$$

where $\Phi_2(.,.,\rho)$ is the cumulative density function of the normal bivariate distribution of means 0, variances 1 and covariance ρ.

Modelling characteristics of employment and achievement from bivariate probit models (simple or ordered)

Several extensions of the model have been made. Allowance has been made for the characteristics of work (working hours or employer type) and/or the level of success – total or partial success (passing one or both semesters).

[3] Index *i* for the student is omitted to simplify notation.

Consequently, if we look at the employment characteristics, the first equation of the model is to be modified. The variable E may take any of four modalities. For the variable characterizing working hours, we have:

$$E = \begin{cases} 0 & \text{: Student not employed during academic year,} \\ 1 & \text{: Student employed less than 8 hours per week,} \\ 2 & \text{: Student employed between 8 and 16 hours per week,} \\ 3 & \text{: Student employed more than 16 hours per week.} \end{cases}$$

For the variable characterizing the employer, we have:

$$E = \begin{cases} 0 & \text{: Student not employed during academic year,} \\ 1 & \text{: Student employed in public sector,} \\ 2 & \text{: Student in casual labour,} \\ 3 & \text{: Student employed in private sector.} \end{cases}$$

Being in employment is modelled using an ordered probit model:

$$E = k \Leftrightarrow t_k < E^* = X_E\beta_E + u_E \leq t_{k+1}; k = 0, 1, 2, 3.$$

Let us note E^1, E^2 and E^3 as the indicators associated with the three modalities characterizing actual employment. u_E, the error term is again supposed to follow a normal standard distribution of mean 0 and variance 1. By convention, $t_0 = -\infty$, $t_4 = +\infty$ and $t_1 = 0$ for any identification problem. We therefore assume that vector X_E includes a constant term. For this relation, we have to estimate β_E, t_2 and t_3.

For academic results, if we consider total success, Equation 2 is unchanged. Working hours are included simply by replacing E by E^1, E^2 and E^3, the indicators defined for characterizing employment. If we look at partial success, the variable for results becomes:

$$Y = \begin{cases} 0 & \text{: Student passed neither semester (total failure)} \\ 1 & \text{: Student passed one semester only (partial success)} \\ 2 & \text{: Student passed both semesters (total success)} \end{cases}$$

Success is then again modelled by an ordered probit model.

$$Y = l \Leftrightarrow s_l < Y^* = f(w) + X_Y\beta_Y + u_Y \leq s_{l+1}; l = 0, 1, 2.$$

where

$$f(w) = \begin{cases} E\gamma & \text{(if employment characteristics are ignored)} \\ E^1\gamma_1 + E^2\gamma_2 + E^3\gamma_3 & \text{(if working hours or employer are included)} \end{cases}$$

u_Y again follows a normal standard distribution with mean 0 and variance 1. For an identification problem, we posit $s_0 = -\infty, s_3 = +\infty$ and $s_1 = 0$; X_Y containing a constant term. The set of parameters to be estimated for this equation is (γ, β_Y, s_2) or $(\gamma_1, \gamma_2, \gamma_3, \beta_Y, s_2)$.

The contributions to the likelihood depend on the definitions used for the various variables. These contributions are given in Appendix 2.

Estimation of the effect of employment on achievement

It is possible to calculate the effects of being in employment or of the type of employment on academic achievement from the different models estimated. We look at total success only. The idea is to compare the probability of a student succeeding when in employment with the probability the same student would have had if not in employment. This amounts to calculating the treatment effect (employment) on the treated (student in employment). Let us note Y_k the student's potential success if in employment ($k = 1$) or not in employment ($k = 0$). The effect of being in employment while in higher education on the academic achievement of students who do have jobs is defined by:

$$\mathrm{ATT_w}(X) = \frac{P(E = 1, Y_1 = 1|X)}{P(E = 1|X)} - \frac{P(E = 1, Y_0 = 1|X)}{P(E = 1|X)}$$

In an equivalent way, the effect of being employed can be calculated for a student not in employment. This amounts to calculating the treatment effect (employment) on the untreated subjects (students not in employment). This effect is measured by:

$$\mathrm{ATNT_w}(X) = \frac{P(E = 0, Y_1 = 1|X)}{P(E = 0|X)} - \frac{P(E = 0, Y_0 = 1|X)}{P(E = 0|X)}$$

In the models with heterogeneous employment, three ATT and ATNT can be calculated (one for each type of employment). Let us note $\mathrm{ATT_k}(X)$ and $\mathrm{ATNT_k}(X)$, $k = 1,2,3$ the treatment effects on the treated and the untreated:

$$\mathrm{ATT_k}(X) = \frac{P(E = k, Y_k = 1|X)}{P(E = k|X)} - \frac{P(E = k, Y_0 = 1|X)}{P(E = k|X)}, \text{ and}$$

$$\mathrm{ATNT_k}(X) = \frac{P(E=0, Y_k=1|X)}{P(E=0|X)} - \frac{P(E=0, Y_0=1|X)}{P(E=0|X)},$$

with

$$\mathrm{k} = \begin{cases} 1 \text{ If employed less than 8 hours per week or if employed in the public sector,} \\ 2 \text{ If employed between 8 and 16 hours per week or if in casual employment,} \\ 3 \text{ If employed more than 16 hours per week or if employed in the private sector.} \end{cases}$$

In order to estimate the mean effects for students in employment (ATT) or for students not in employment (ATNT) we calculate the empirical mean of all estimated conditional effects. The SDs of these effects are calculated by bootstrapping from 500 replications.

V. Results

The determinants of access to employment while in education

Table 2 (columns 1 and 3) shows the effect of the different individual characteristics of students in employment while in education. On one side, the findings confirm the importance of how time is allocated, the constraint of course attendance for students. Those who must, in theory at any rate, attend more than 20 hours of lectures and tutorials per week more rarely have jobs. Commuting time to university does not seem to influence the decision about taking a job. The socio-economic characteristics of the family have a major impact, with children of parents in senior management or in middle management having more frequent access to employment while in education. This can be explained by a network effect and information on student job offers, since parents in management positions can draw on their social relations to find work for their offspring while still in education. The attribution of grants or other public financial support does not seem to have any effect. Government grants limit or even sometimes prohibit combining employment and education. Conversely, receiving financial support from parents markedly reduces the probability of working while in education. In other words, for equivalent social backgrounds, taking up employment while in education is a response to a need for income that can offset the absence of family financial support. Having a large number of siblings slightly increases the probability of being in employment. Foreign students, by contrast, have more difficulty finding employment while in education because of legal constraints.

The characteristics of past academic record also discriminate among students; those who repeated classes before going to university are less likely to have a paid job. It may be explained by the fact that these students must devote full-time effort to their university work, in order to offset their past academics performance. Differences in courses and levels of education also structure the chances of taking employment; those studying human sciences are more often in employment while still in education than students taking legal and economic or scientific courses. Likewise, fewer second-year undergraduates are in employment than third-year undergraduates, who need more independence. In addition, all things being equal, those who have fallen behind are more likely to be in employment while continuing their education. It might be that while their past career has led them to expect lower chances of success, they are more ready to take up employment while still in education. Age effect strengthens their increased need for individual autonomy and financial independence. Lastly, women are more likely than men to be in employment while studying, which is also observed in the data of the National Observatory of Student Life, when employment competes with education. The explanation lies partly in the number of service jobs available to students, which are more commonly taken up by women, whether during or after their education.

The effect on achievement

Two measurements of achievement are proposed in the various estimations. The first is for a completely successful academic year. The second includes the possibility of a partially successful academic year. The purpose is to try to capture possible strategies of students in employment aiming for success in certain examinations or for just one semester.

Table 2 shows the influence of student employment on success after endogenizing employment. The effect is highly negative, whether one considers total (column 3) or partial success (column 4). The effect of individual characteristics on achievement is, on the other hand, far more moderate, with the exception of a few characteristics associated with the past or present academic career of students and with their sex. Repeating years in secondary education, as an indicator of the student's academic level, has a negative influence on achievement. Likewise, as often observed, young men have more difficulties than young women. Lastly, achievement varies by discipline and level of study; it is more difficult for second-year undergraduates and for students on economics and law courses.

Table 3 summarizes the results of the three estimations: the previous estimation in which employment is not distinguished, a second estimation in which the number of hours of employment is endogenized and a third estimation in which employer type is endogenized. The results for the second estimation argue for the relevance of the

Table 2. Estimation of the probability of having a student job and achieving academic success

	Employment	Total success	Employment	Total or partial success
Constant	0.204	2.199***	0.203	2.683***
	(0.32)	(0.26)	(0.32)	(0.27)
Student in employment		−1.449***		−1.378***
		(0.31)		(0.29)
Education level: 3rd-year undergraduate (ref)				
2nd-year undergraduate	−0.277***	−0.383***	−0.281***	−0.338***
	(0.11)	(0.13)	(0.11)	(0.12)
Speciality: Arts (ref)				
Law–Economics–Administration	−0.309**	−0.266*	−0.313**	−0.235*
	(0.13)	(0.14)	(0.13)	(0.14)
Sciences	0.023	−0.111	0.01	−0.099
	(0.13)	(0.15)	(0.13)	(0.15)
Other	−0.651**	−0.41	−0.653**	−0.487*
	(0.31)	(0.28)	(0.31)	(0.27)
Student repeated year before university	−0.259**	−0.312**	−0.255*	−0.295**
	(0.13)	(0.14)	(0.13)	(0.13)
Grant student: no (ref)				
From French government	−0.157		−0.156	
	(0.11)		(0.11)	
Other	−0.618		−0.614	
	(0.39)		(0.39)	
Financial support: no (ref)				
Public: Yes	0.127		0.126	
	(0.11)		(0.11)	
Family: No	−0.515***		−0.516***	
	(0.11)		(0.11)	
Lecture or seminar time, on paper: less than 20 hours per week				
More than 20 hours per week	−0.230**		−0.224**	
	(0.10)		(0.10)	
Desired degree				
Master's at least	−0.044		−0.063	
	(0.18)		(0.18)	
Do not yet know	−0.189		−0.209	
	(0.22)		(0.22)	
More than 1 hour commuting time	−0.548		−0.523	
	(0.51)		(0.52)	
Student has general (not vocational) high-school diploma		−0.054		−0.152
		(0.21)		(0.21)
Student is male	−0.260**	−0.314***	−0.257**	−0.283**
	(0.11)	(0.12)	(0.11)	(0.12)
Student is foreign	−0.669***	−0.047	−0.660***	0.011
	(0.21)	(0.21)	(0.21)	(0.21)
Student: is in 'normal' age group (ref)				
Is ahead of age group	−0.386*	0.249	−0.389*	0.289
	(0.23)	(0.31)	(0.23)	(0.31)
Is behind age group	0.519***	−0.145	0.522***	−0.183
	(0.13)	(0.15)	(0.13)	(0.15)
Student has at least one child	0.275		0.301	
	(0.45)		(0.45)	
Number of siblings	0.058*		0.059*	
	(0.03)		(0.04)	
Socio-occupational category of head of family: manual worker (ref)				
Senior executive	0.512**		0.504**	
	(0.20)		(0.20)	
Middle management	0.474**		0.487**	
	(0.23)		(0.23)	

(*continued*)

Table 2. Continued

	Employment	Total success	Employment	Total or partial success
Farmer, craftsman, shopkeeper	0.301		0.279	
	(0.25)		(0.25)	
Company manager	−0.297		−0.304	
	(0.34)		(0.34)	
Clerical	0.267		0.266	
	(0.19)		(0.19)	
No occupation	0.248		0.253	
	(0.21)		(0.21)	
Student lives: at parents' home (ref)				
Alone	−0.462***		−0.438***	
	(0.15)		(0.15)	
Shared student let	−0.329**		−0.312**	
	(0.16)		(0.16)	
Other	−0.452		−0.442	
	(0.44)		(0.44)	
Threshold				0.452***
				(0.06)
Covariance	0.722***		0.691***	
	(0.16)		(0.14)	

Notes: * denotes significance at 10% level.
** denotes significance at 5% level.
*** denotes significance at 1% level.
SDs are in parentheses.

number of hours worked per week, as can be observed in the literature. Working less than 8 hours per week seems to have no effect whereas working between 8 and 16 hours, then above all more than 16 hours greatly impairs the chances of success, whether total or partial. In the third row of Table 3, employment during the academic year is distinguished by type of employer, the assumption being that public sector employment is less of a constraint than casual labour and above all than employment in the private sector. The results do indeed show that working in the public sector does not seem to significantly impair academic achievement. Conversely, casual work and above all employment in the private sector has a negative impact on success. In the latter two instances, constraints on student life therefore seem to be greater, with students having less flexibility with their study time. By contrast, student employment in the public sector is often as supervisors in middle or high schools or as leisure-centre monitors. It is often possible to vary working hours, especially at examination times or by swapping duties with other students who are plentiful in this type of employment.[4]

From the coefficients estimated previously, it was possible to calculate the counterfactual probabilities of achievement for students in employment in the event they are not in employment, and then the counterfactual probabilities for students not in employment in the event they were in employment, and to compare these with the estimated probabilities of actual achievement. Tables 4 and 5 show the mean effects on achievement of employment for students in employment (ATT) and for students not in employment (ATNT). For the former, the effects are barely significant; were they not in work, students in employment would have a slightly higher probability of success but often not significantly so (Table 4). However, those who work 16 hours per week would have an 18 percentage point higher chance of success, which shows that the time constraint greatly influences academic achievement. Similarly, students who do casual work or are employed in the private sector would have chances of success that are 11 and 15 percentage points higher, respectively. The effects are greater for students not in employment (Table 5). Having a job would lead them to far higher risks of failure. Regardless of the type of employment, their chances of academic success would be 43 percentage points lower and would not exceed 50%. In other words, employment would halve their probability of success. The gap is even wider for those working more than 16 hours, for whom the chances of success would fall by almost 48 percentage points. These findings reveal that students who are in employment while still in education are not necessarily those who have the greatest chances of failure. However, if those who are not employed were forced to hold down a job, their chances

[4] The results for all of the explanatory variables are not set out in the article as they are comparable with those for the models associated with employment (Table 2). They can be obtained from the authors on request.

Table 3. Effects of various characteristics of student employment on academic achievement

	Total success		Total or partial success	
1/At least one job during academic year	−1.449***	0.722***	−1.378***	0.691***
In employment during term time	(0.31)	(0.16)	(0.29)	(0.14)
2/Intensity of student employment (hours)				
Ref. Not in employment or only outside term time				
Less than 8 hours per week	−0.246	0.542***	−0.21	0.555***
	(0.50)	(0.18)	(0.50)	(0.17)
8 to 16 hours per week	−1.065***		−1.067***	
	(0.35)		(0.34)	
More than 16 hours per week	−1.727***		−1.734***	
	(0.44)		(0.42)	
3/Employer types				
Ref. Not in employment or only outside term time				
Public sector	−0.398	0.712***	−0.310	0.693***
	(0.44)	(0.14)	(0.43)	(0.13)
Casual work	−1.305***		−1.248***	
	(0.30)		(0.29)	
Private sector	−1.774***		−1.725***	
	(0.34)		(0.32)	

Notes: *** denotes significance at 1% level.
SDs are in parentheses. Columns 1 and 3 give estimates parameters and SDs. Columns 2 and 4 give estimated covariances.

Table 4. Estimated mean effect of employment for students in employment

Student in employment	Estimated probability of success (%)	ATT (percentage points)
Employed	85.9	−11.7
		(8.9)
Less than 8 hours per week	97.8	0.4
		(4.5)
8 to 16 hours per week	86	−9.9
		(7.6)
More than 16 hours per week	77.9	−18.2*
		(10.8)
Public sector	96.1	−1.1
		(6.1)
Causal work	87.1	−11.2*
		(5.9)
Private sector	82.3	−15.5**
		(7.8)

Notes: * denotes significance at 10% level.
** denotes significance at 5% level.
SDs in parentheses are calculated by bootstrapping starting from 500 replications.

Table 5. Estimated mean effect of employment for students not in employment

	Estimated probability of success (%)	ATNT (percentage points)
Student not in employment	90.8	
If student were in employment		
Employed		−43.2**
		(22.0)
Less than 8 hours per week		−3.3
		(15.2)
8 to 16 hours per week		−27.4
		(19.3)
More than 16 hours per week		−47.9*
		(25.4)
Public sector		−6.9
		(18)
Casual work		−39.7*
		(21.6)
Private sector		−53.9**
		(24.3)

Notes: * denotes significance at 10% level.
** denotes significance at 5% level.
SDs in parentheses are calculated by bootstrapping starting from 500 replications.

of success would be considerably reduced. This is a problem of self-selection. Students who are not in employment are those with a strong preference for leisure and/or who expect they could not handle education and employment together. These results are consistent with those of Beffy *et al.* (2009), although of smaller amplitude as concerns the mean effect on whether students in employment (ATT) are successful. This can be explained by differences in the population surveyed, as their data were national and concerned students from 1992 to 2002, whereas ours relate to students from just one university surveyed in 2012. Depending on how easy it is to find a job on the local labour market and to be more or less

flexible about working hours, the effects of student employment may be more or less detrimental. Our results tend to show, though, like those of Beffy *et al.* (2009), that the choice of working is not necessarily dictated by expectation of little chance of success or less motivation for education. Students who are employed for more than 16 hours per week would be more successful if they did not have jobs. Conversely, those who are not in employment would be in greater difficulty if they decided to take a job.

VI. Conclusion

This study was designed to examine the consequences of employment while in education on academic achievement taking into account the endogenous nature of student employment and especially of the number of hours' employment. Our findings clearly show the adverse effect of employment, especially when working more than 8 hours per week. Above this level, the more time spent in employment, the more education is harmed. The same is true for the types of employment. Public sector employment, mainly jobs as supervisors in middle and high schools, seems to be less of an impairment. Reconciling work and study time in public sector is easier than in the private sector. Our results also emphasize the importance of allowing for the endogeneity of student employment; students with jobs tend to have the observed or unobserved characteristics for being successful. Their failure in education therefore seems to be the consequence of holding down a job that competes with education and reduces the effort they can put into study.

However, these results require further investigation. A more precise survey of student time tables would provide insight into how students reconcile employment and education. Do they cut down on leisure time? Do they study more intensively in the months before examinations? Do they set a lot of store by attendance? The question of students' financial resources also needs to be specified; information on the precise income of students would provide insight as to from what level of resources students are compelled to get jobs. The effect is a complex one insofar as being in employment seems to be facilitated by the parents' social capital whereas the beneficiaries of government grants based on social criteria tend less to combine them with income from employment during their education, with some types of employment even excluding the attribution of grants. Even so our results indicate the intensity of the time constraint on academic achievement. The policy to promote academic achievement might take several directions. It could provide incentives for students to reduce the number of hours in employment by paying them additional support, for example. Next, more flexible employment and education time seem to be decisive. This could be achieved by developing time tables that are slightly more suitable for students in employment and, for example, by proposing lectures or seminars in the evenings or on Saturdays. Thought might also be given to how to help students find employment that competes less with education, for example, by centralizing the most suitable job offers (Dmitrijeva *et al.*, 2013).

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References

Becker, W. E. (1982) The educational process and student achievement given uncertainty in measurement, *American Economic Review*, **27**, 229–36.

Béduwé, C. and Giret, J. F. (2004) Le travail en cours d'études a-t-il une valeur professionnelle?, *Economie Et Statistique*, **378**, 55–83. doi:10.3406/estat.2004.7225

Beffy, M., Fougère, D. and Maurel, A. (2009) L'impact du travail salarié des étudiants sur la réussite et la poursuite des études universitaires, *Economie Et Statistique*, **422**, 31–50. doi:10.3406/estat.2009.8017

Beffy, M., Fougère, D. and Maurel, A. (2013) The effect of college employment on graduation: evidence from France, CEPR Discussion Paper, 9565.

Brint, S. and Cantwell, A. M. (2010) Time use and academic outcomes: result from UCUES 2006, *Teachers College Record*, **112**, 2441–70.

Buscha, F., Maurel, A., Page, L. *et al.* (2012) The effect of employment while in high school on educational attainment: a conditional difference-in-differences approach, *Oxford Bulletin of Economics and Statistics*, **74**, 380–96. doi:10.1111/j.1468-0084.2011.00650.x

D'Amico, R. (1984) Does employment during high school impair academic progress?, *Sociology of Education*, **57**, 152–64. doi:10.2307/2112599

Dmitrijeva, J., L'Horty, Y., Du Parquet, L. *et al.* (2013) Comment améliorer la qualité des emplois salariés exercés par les étudiants ? Les enseignements d'une expérience contrôlée, *Working Papers halshs*, 00848539, HAL.

Eckstein, Z. and Wolpin, K. I. (1999) Why youths drop out of high school: the impact of preferences, opportunities, and abilities, *Econometrica*, **67**, 1295–339. doi:10.1111/1468-0262.00081

Ehrenberg, R. and Sherman, D. (1987) Employment while in college, academic achievement, and postcollege outcomes: a summary of results, *The Journal of Human Resources*, **22**, 1–24. doi:10.2307/145864

Gruel, L. and Tiphaine, B. (2004) Formes, conditions et effets de l'activité rémunérée, *Education Et Formations*, **67**, 51–60.

Kalenkoski, C. M. and Pabilonia, S. W. (2012) Time to work or time to play: the effect of student employment on homework, sleep, and screen time, *Labour Economics*, **19**, 211–21. doi:10.1016/j.labeco.2011.10.002

Levin, H. M. and Tsang, M. C. (1987) The economics of student time, *Economics of Education Review*, **6**, 357–64. doi:10.1016/0272-7757(87)90019-7

Lévy-Garboua, L. (1976) Les demandes de l'étudiant ou les contradictions de l'université de masse », *Revue Française De Sociologie*, **17**, 53–80. doi:10.2307/3321303

Light, A. (1998) Estimating returns to schooling: when does the career begin?, *Economics of Education Review*, **17**, 31–45. doi:10.1016/S0272-7757(97)00011-3

Lillydahl, J. H. (1990) Academic achievement and part-time employment of high school students, *The Journal of Economic Education*, **21**, 307–16. doi:10.2307/1182250

McNeal, R. B. (1997) Are students being pulled out of high school? The effect of adolescent employment on dropping out, *Sociology of Education*, **70**, 206–20. doi:10.2307/2673209

Meng, C. and Heijke, H. (2005) *Student Time Allocation, the Learning Environment and the Acquisition of Competencies, Research Memoranda 001*, ROA, Research Centre for Education and the Labour Market, Maastricht.

Molitor, C. J. and Leigh, D. E. (2005) In-school work experience and the returns to two-year and four-year colleges, *Economics of Education Review*, **24**, 459–68. doi:10.1016/j.econedurev.2004.09.003

Montmarquette, C., Viennot-Briot, N. and Dagenais, M. (2007) Dropout, school performance, and working while in school, *The Review of Economics and Statistics*, **89**, 752–60. doi:10.1162/rest.89.4.752

Oosterbeek, H. and van den Broek, A. (2009) An empirical analysis of borrowing behaviour of higher education students in the Netherlands, *Economics of Education Review*, **28**, 170–77. doi:10.1016/j.econedurev. 2008.01.005

Pinto, V. (2010) L'emploi étudiant et les inégalités sociales dans l'enseignement supérieur, *Actes De La Recherche En Sciences Sociales*, **183**, 58–71. doi:10.3917/arss.183.0058

Ruhm, C. (1997) Is high school employment consumption or investment?, *Journal of Labor Economics*, **15**, 735–76. doi:10.1086/209844

Stinebrickner, R. and Stinebrickner, T. (2003) Working during school and academic performance, *Journal of Labor Economics*, **21**, 473–91. doi:10.1086/345565

Appendix 1. Descriptive statistics

Table A1. Descriptive statistics for entire sample

	All students surveyed	Students not in employment in last year in education	Students in employment in last year in education
Numbers	823	606	217
Passed academic year	89.4	90.8	85.7
In employment:	26.4	0	100
Educational level:			
2nd year undergraduate	66.3	69.0	59.0
3rd year undergraduate	33.7	31.0	41.0
Speciality			
Law – Economics – Administration	31.8	34.8	23.5
Arts	38.4	35.5	46.5
Sciences	25.4	24.4	28.1
Other	4.4	5.3	1.8
Repeated year before starting university	21.5	21.0	23.0
Grant holder			
No	52.6	51.8	54.8
From French government	44.4	44.4	44.2
Other	3.0	3.8	0.9
Financial dependence			
Low	16.2	12.2	27.2
Medium	43.3	39.4	53.9
High	40.6	48.4	18.9
Time spent on study:			
Less than 25 hours per week	20.9	20.5	22.1
25 to 35 hours per week	63.2	61.7	67.3
More than 35 hours per week	15.9	17.8	10.6
Desired degree			
First degree	7.7	7.3	8.8
At least Master's	78.6	77.4	82.0
Do not yet know	13.7	15.4	9.2
More than 1 hour commuting time	1.3	1.5	0.9
Male	34.6	36.5	29.5
Foreign	9.5	10.9	5.5

(*continued*)

Table A1. Continued

	All students surveyed	Students not in employment in last year in education	Students in employment in last year in education
Student is			
Ahead of age group	7.3	8.8	3.2
In age group	66.7	69.3	59.5
Behind age group	26.0	22.0	37.3
Student has one child	1.5	1.0	2.8
Number of siblings	1.8	1.7	2.0
Socio-occupational category of head of family			
Senior executive	25.2	24.1	28.1
Middle management	10.2	9.4	12.4
Farmer, craftsman, shopkeeper	7.2	7.6	6.0
Company manager	5.0	6.1	1.8
Clerical	24.5	24.6	24.4
Manual worker	10.3	11.4	7.4
No occupation	17.6	16.8	19.8
Student lives			
At parents' homes	16.8	15.0	21.7
Alone	53.7	56.9	44.7
Share student let	28.0	26.7	31.3
Other	1.6	1.3	2.3

Appendix 2. Bivariate probit models with ordered variables

Let us consider the relations associated with employment and academic achievement.

(1) Employment

Two cases are contemplated: (i) the student is or is not employed independently of course requirement and in academic term time, (ii) when the student is in employment, the job is characterized either by the number of hours per week or by employer type. The latent variable associated with employment is defined by: $E^* = X_E\beta_E + u_E$ with:

(a) Student in employment: $E = 1 \Leftrightarrow E^* \geq 0$,
(b) Student in employment of type k: $E = k \Leftrightarrow t_k < E^* \leq t_{k+1}; k = 0, 1, 2, 3$.

(2) Academic achievement

Two cases are contemplated: (i) student passes full academic year (both semesters), (ii) student passes part of academic year (just one semester). The associated latent variable is defined by: $Y^* = f(w) + X_Y\beta_Y + u_Y$, $f(w)$ is a function characterizing the student's job, such that:

$$f(w) = \begin{cases} E\gamma & \text{(if job characteristics are ignored)} \\ E^1\gamma_1 + E^2\gamma_2 + E^3\gamma_3 & \text{(if number of hours worked or employer type are included)} \end{cases}$$

E^k is an indicator associated with modality k of the job held variable, $k = 1,2,3$.

(i) Student passes entire year: $Y = 1 \Leftrightarrow Y^* \geq 0$
(ii) Student can pass part of year: $Y = l \Leftrightarrow s_l < Y^* \leq s_{l+1}; l = 0, 1, 2$.

The errors are assumed to obey a bivariate normal law, $\begin{pmatrix} u_E \\ u_Y \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \sigma_{EY} \\ \sigma_{EY} & 1 \end{pmatrix}\right)$.

Depending on the model considered, the likelihood contributions differ.

Model 1: Homogeneity of employment and academic achievement

Here, we have four different likelihood contributions:

(a) Student in employment and passed year: $E^* = X_E\beta_E + u_E \geq 0$ and $Y^* = E\gamma + X_Y\beta_Y + u_Y = \gamma + X_Y\beta_Y + u_Y \geq 0$, the contribution is therefore: $\Phi_2(X_E\beta_E, \gamma + X_Y\beta_Y, \sigma_{EY})$,
(b) Student in employment but failed year: $E^* = X_E\beta_E + u_E \geq 0$ and $Y^* = E\gamma + X_Y\beta_Y + u_Y = \gamma + X_Y\beta_Y + u_Y < 0$, the contribution is therefore: $\Phi_2(X_E\beta_E, -\gamma - X_Y\beta_Y, -\sigma_{EY})$,

(c) Student not in employment and passed year: $E^* = X_E\beta_E + u_E < 0$ and $Y^* = E\gamma + X_Y\beta_Y + u_Y = X_Y\beta_Y + u_Y \geq 0$, the contribution is therefore: $\Phi_2(-X_E\beta_E, X_Y\beta_Y, -\sigma_{EY})$,

(d) Student not in employment and failed year: $E^* = X_E\beta_E + u_E<0$ and $Y^* = E\gamma + X_Y\beta_Y + u_Y = X_Y\beta_Y + u_Y<0$, the contribution is therefore: $\Phi_2(-X_E\beta_E, -X_Y\beta_Y, \sigma_{EY})$

Model 2: Heterogeneity of employment and total success.

We have two types of contributions depending on whether student passed or failed year.

(a) Student failed year: $t_E < E^* = X_E\beta_E + u_E \leq t_{E+1}$ and $Y^* = E^1\gamma_1 + E^2\gamma_2 + E^3\gamma_3 + X_Y\beta_Y + u_Y = f(w) + X_Y\beta_Y + u_Y < 0$
Likelihood contribution:

$$\Phi_2(t_{E+1} - X_E\beta_E, -f(w) - X_Y\beta_Y, \sigma_{EY}) - \Phi_2(t_E - X_E\beta_E, -f(w) - X_Y\beta_Y, \sigma_{EY})$$

(b) Student passed year: $t_E < E^* = X_E\beta_E + u_E \leq t_{E+1}$ and $Y^* = E^1\gamma_1 + E^2\gamma_2 + E^3\gamma_3 + X_Y\beta_Y + u_Y = f(w) + X_Y\beta_Y + u_Y \geq 0$
Likelihood contribution:

$$\Phi_2(t_{E+1} - X_E\beta_E, f(w) + X_Y\beta_Y, -\sigma_{EY}) - \Phi_2(t_E - X_E\beta_E, f(w) + X_Y\beta_Y, -\sigma_{EY})$$

For each type of contribution we have four different cases depending on type of employment.

Model 3: Homogeneity of employment and heterogeneity of academic achievement

We have two types of contribution depending on whether student is in employment or not independently of curriculum and in term time.

(a) Student not in employment ($E = 0$): $E^* = X_E\beta_E + u_E<0$ and $s_Y<Y^* = X_Y\beta_Y + u_Y \leq s_{Y+1}$
Likelihood contribution:

$$\Phi_2(-X_E\beta_E, s_{Y+1} - X_Y\beta_Y, \sigma_{EY}) - \Phi_2(-X_E\beta_E, s_Y - X_Y\beta_Y, \sigma_{EY})$$

(b) Student in employment ($E = 1$): $E^* = X_E\beta_E + u_E \geq 0$ and $s_Y<Y^* = \gamma + X_Y\beta_Y + u_Y \leq s_{Y+1}$
Likelihood contribution:

$$\Phi_2(-X_E\beta_E, s_{Y+1} - \gamma - X_Y\beta_Y, -\sigma_{EY}) - \Phi_2(-X_E\beta_E, s_Y - \gamma - X_Y\beta_Y, -\sigma_{EY})$$

Here again, for each type of contribution we have four different cases, depending on the value taken by the variable characterizing success.

Model 4: Heterogeneity of employment and academic achievement

For a student associated with the pair (E,Y) we have: $t_E < E^* = X_E\beta_E + u_E \leq t_{E+1}$ and

$$s_Y<Y^* = E^1\gamma_1 + E^2\gamma_2 + E^3\gamma_3 + X_Y\beta_Y + u_Y = f(w) + X_Y\beta_Y + u_Y \leq s_{Y+1}$$

The contribution to likelihood of this student is defined by:

$$\Phi_2\left(t_{E+1} - X_E\beta_E, s_{y+1} - f(w) - X_Y\beta_Y, \sigma_{EY}\right) - \Phi_2\left(t_{E+1} - X_E\beta_E, s_y - f(w) - X_Y\beta_Y, \sigma_{EY}\right)$$

$$-\Phi_2\left(t_E - X_E\beta_E, s_{y+1} - f(w) - X_Y\beta_Y, \sigma_{EY}\right) + \Phi_2\left(t_E - X_E\beta_E, s_y - f(w) - X_Y\beta_Y, \sigma_{EY}\right)$$

This modelling features 12 contributions with differing likelihoods.