

# The impact of students' part-time work on educational outcomes

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## **Non-technical summary**

Using a sample of young people in England collected in 2006 and beyond, we find that students aged 16, who report working during a term, spent on average 6,5 hours per week at work. This is less than the average for the US, but it remains a non-negligible amount of time which cannot be used for leisure nor educational activities. It is important to determine the extent to which labour market participation by youth who are still in compulsory education affects school outcomes.

There are two ways that students' part-time jobs can influence their educational results. On the one hand, it can improve or help develop particular personal characteristics, including responsibility, work organization and time management, which could in return enhance school achievements. However, most on-the-job training mainly improves non-cognitive skills, which are not measured by standard school exams. On the other hand, employment reduces the time available for educational activity and therefore could lead to lower educational achievements, possibly resulting school withdrawal. The overall outcomes associated with part-time student employment depend on the relative sizes of these the following two effects: "learning by doing" when employed and the decreased amount of investment in formal education, which affects an individual's productivity.

I address the issue of a student's part-time employment at age 16 and its impact on educational outcomes at this age and educational participation at age 17. My estimates, obtained using the Longitudinal Study of Young People in England (LSYPE) and based on a cohort born in 1989/1990, indicate that part-time employment at the age of 16 has a small, detrimental effect on GCSE performance, while controlling for results of tests taken at the age of 11 and other family and personal characteristics. Furthermore, my findings suggest that those students who were employed part-time during the school term have a lower probability of continuing in post-compulsory education, even when controlling for final exam results.

# The impact of students' part-time work on educational outcomes

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## Abstract

This paper addresses the issue of school students' part-time employment in the last year of compulsory education, and its impact on educational outcomes. Estimating the causal effect is not straightforward. Firstly, those who obtain part-time employment could have certain unobservable characteristics, which also have an impact on their educational outcomes. Secondly, the decisions to work part-time while still in school and to continue education after age 16 might be made simultaneously, which leads to a problem with endogeneity. To account for this, I apply an instrumental approach and a recursive bivariate probit estimation. My results suggest that working part-time during the last year of compulsory education has a negative impact on educational achievements and on participation in education in the subsequent year.

**Keywords:** students' labour supply, educational attainment, exam results, post-compulsory education participation.

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## I. Introduction

According to data from the Longitudinal Study of Young People in England, in 2006, almost 27% of 16-year-old students pursuing a full-time education reported having a part-time job during the school term.<sup>2</sup> Although the intensity of their labour market participation varied, those who worked spent 6.5 hours per week on average in paid employment, which is lower than the 11 hours spent in employment by their American counterparts (Rothstein, 2007). Despite this, part-time employment among full-time students in the UK is an important form of labour market participation, and one that is often neglected in economic research. By contrast, there are a larger number of empirical studies relating to the United States, dating from the 1980s (Meyer and Wise, 1982) to more recent research (Sabia, 2009; Kalenkoski and Pabilonia, 2009). However, these focus mainly on the work experiences of college and university students, while less attention is given to the employment of those still in compulsory full-time education.

A part-time job may improve or help develop particular personal characteristics, including responsibility, work organization and time management (Steinberg et al., 1981; Steinberg and Greenberger, 1982), which could directly improve a young person's future position in the labour market. However, most on-the-job training mainly improves non-cognitive skills, which are not measured by standard school tests and exams. On the other hand, time spent working reduces the time available for educational activity (Kalenkoski and Pabilonia, 2009) and therefore could lead to lower educational achievements, possibly resulting in school withdrawals. In this human capital setting, the overall outcomes associated with the part-time employment of students depend on the following effects: "learning by doing" while employed and the effect that lower time investment in formal education has on an individual's productivity. Estimating the causal effect of employment at the age of 16 on later outcomes is not straightforward. For example, one might expect that some unobservable characteristics (i.e., work ethic, or the utility of income) impact both the propensity to be employed part-time at the age of 16 and educational outcomes at an older age.

Empirical studies on part-time work among students and its impact on their educational outcomes report contradictory results, depending on the methods adopted, the respondent's age, level of education, and the country of study. Some report a detrimental effect (Kalenkoski and Pabilonia, 2009; Beffy et al., 2010), while others find a negative

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<sup>2</sup> Researcher's calculations.

impact only in the case of students from less favourable backgrounds that worked more than 20 hours per week (Oettinger, 1999). More authors report a negligible or non-existent impact (D'Amico, 1984; Stinebrickner and Stinebrickner, 2003; Rothstein, 2007; Montmarquette et al., 2007; Buscha et al., 2008). However, the majority of the available literature is based on American data and, as stated by American researchers Steinberg and Greenberger (1986), “the proportion of the youth cohort who work, the extent of their commitment to jobs, and the social origins of youngsters who work are not duplicated elsewhere in the world today”. This implies that the results from the US context are unlikely to be relevant to other contexts, and yet few studies extend this analysis to other regions.

However, slightly different results are presented from European countries. Beffy et al., (2010), while correcting for the potential endogeneity of early employment, still found a negative impact of part-time employment on French undergraduate and postgraduate students. They found that working part-time significantly reduced the probability of graduation, even after using an instrumental variables approach to control for the endogeneity of part-time employment. No impact of part-time employment while at school was found for Northern Ireland (Mcvicar and Mckee, 2001) subjects. Using a relatively small sample of 428 students, they examined employment during post-compulsory education. However, when intensive part-time work (more than 15 hours per week) was considered, the effect became significantly negative. However, the reliability of these results is questionable, due to a relatively small sample size (428 individuals). On the other hand, in a different UK study by Dustmann and Van Soest (2009), while examining the impact of employment of 16-year-olds on several outcomes and applying a structural modelling approach, they found that part-time employment has a negative, although very small, impact on exam results for girls, but there was no impact for boys. However, this study was based on data from the NCDS, which follows a cohort born in 1958, so eligibly to leave school would occur in 1974. During this time, the rising trend in earnings premiums associated with non-manual occupations had just begun, so some educational choices were formulated without this knowledge. Nowadays, students are more aware of the higher returns of education, which could also influence their education choices. This is reflected through a much higher education attainment in the most recent data, as well as a lower part-time employment rate among students in compulsory education.

This paper examines the impact of part-time employment at the age of 16 whilst still in compulsory full-time education, based on two outcomes: performance in GCSE<sup>3</sup> exams and the probability of continuing education at the age of 17, based on data from the Longitudinal Study of Young People in England (LSYPE). This paper contributes to the existing literature in a number of ways. It identifies the impact of early employment during compulsory education on outcomes of all students.. Furthermore, by using the English data, I compare my results with those from the US in a different institutional setting. The culture of work, labour market regulations, and macroeconomic conditions as well as the education system in the US differ from those in the England. Obtaining evidence based on English data allows a better understanding of these phenomena and an opportunity to formulate conclusions and recommendations tailored for specific conditions. Previous studies have examined the determinants of part-time work among 16-year-olds (Dustmann et al., 1996), and the relationship with parental financial transfers (Dustmann et al., 2009). However, to my knowledge, there are very few studies (Dustmann and Van Soest, 2007) that focus of the impact of part-time work at the age of 16 on educational outcomes in England and use the most recent data.

The paper is organized as follows. Section II describes the data and provides some descriptive statistics, section III presents an empirical approach used in this study, and the results are discussed in section IV and summarized afterwards.

## **II. Data and descriptive statistics**

The Longitudinal Study of Young People in England (LSYPE) is a cohort study that collects information annually from a population sample born between 1<sup>st</sup> September 1989 and 31<sup>st</sup> August 1990 in England. The first set of data was collected in 2004, when 15,700 pupils aged 13-14 and their parents were interviewed. In addition, administrative data about exam results was linked to interviewed respondents and made available in wave 5. The most recent wave up to the time this article was produced is wave 6 (2009), in which only the respondents (then ages 18-19 years old) were interviewed and answered questions about themselves and their households.

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<sup>3</sup> GCSE stands for General Certificate of Secondary Education. It is a non-compulsory, nationally administrated examination taken at the age of sixteen, and it covers a range of subjects. In general, the final grade is based both on coursework and on examination results. GCSEs are graded on an eight-point scale: A\*(highest), A, B, C, D, E, F and G (lowest). There is no regulation about the minimum or maximum number of subjects to be taken by a pupil. However, obtaining five or more A\*- C grades is usually required for entry into post-secondary education.

This data provides a comprehensive set of information about a child and his/her household, as well as details about parents or guardians. The questionnaire changed as the respondents aged, including questions mainly related to children's attitudes and involvement in education, extracurricular courses, special educational needs, and educational aspirations and expectations discussed in the first three waves. Questions about labour market participation and characteristics of further education were introduced in wave 4, when respondents were eligible to complete compulsory education. Additionally, parents who were interviewed in the first five waves provided information about household characteristics, family composition, family finances, activities and their attitudes towards their child's future educational attainment.

Sample attrition is an issue in the LSYPE. For example, of the original sample of 15,700 pupils interviewed in 2004, 77% were interviewed in 2006 and 62% were interviewed in 2009. If specific characteristics are held by individuals that are removed from the sample, it is no longer representative, so the estimates can be biased. Furthermore, this attrition has been shown to be non-random (Collingwood, et al. 2010). This is addressed by calculating inverse probability weights, which are used in main regressions. This will be discussed later in the methodological section.

The main independent variable of interest is derived from responses to the following question asked at wave 3 (2006), when respondents were 16 years old:

*Do you ever do any work (paid job) in your spare time during term time, even if it's only for an hour or two every now and then? Please don't include jobs you only do during the school holidays or voluntary work.* Those who answered "yes" were then asked for the average number of hours worked per week<sup>4</sup>. Depending on the specification, I use two dependent variables. The first dependent variable, which indicated the number of GCSEs passed with grades of A\*-C, was constructed from administrative data about exam results, merged to LSYPE and made available in wave 5. The dependent variable in the second specification is based on responses to a question about the respondent's main activity at the age of 17, and it was asked in wave 4 (2007). The variable takes the value of one if an individual remains in any form of education at the age of 17, and zero otherwise.

The LSYPE has some limitations. Since the panel is young and has experienced a limited number of waves, the analysis of long-term outcomes is restricted. It is also confined to one cohort, so it may not be possible to generalize findings to other cohorts. Finally, young

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<sup>4</sup> Wave 3 fieldwork ran from April 2006 until September 2006, so it can be assumed that all respondents were still in compulsory education.

people from England are only considered and is not, therefore, representative of the UK as a whole.

### A. Descriptive statistics

Table 1 summarizes the extent of part-time employment during the school term using LSYPE. This shows that 26.5% of LSYPE respondents reported having part-time jobs during term time; the occurrence was slightly higher for girls (27.2 %) than boys (26.5%), but this difference is not statistically significant. More than one-half of those who were employed worked between 3 and 9 hours per week. Only 3% of 16-year-olds (10.7% of those employed) worked more than 12 hours per week.

**Table 1: Distribution of weekly hours of work by 16-year-olds during term time by gender**

	Total		Women		Men	
	% of all	% of all employed	% of all	% of employed	% of all	% of employed
Employed	26.5	100	27.2	100	26.2	100
Hours worked per week:						
less than 3	5.0	19.1	4.0	14.8	6.0	23.4
3-6	8.5	32.0	8.4	30.9	8.6	33.1
6-9	7.2	27.1	8.5	31.5	5.8	22.5
9-12	2.8	10.6	3.2	11.9	2.4	9.3
12-15	1.4	5.1	1.6	5.8	1.1	4.4
more than 15	1.6	6.2	1.4	4.7	1.8	6.3

Table 2 presents sample means of a range of individual and family characteristics by whether or not the young person was employed at the age of 16. Those who worked part-time had fewer siblings on average and were more likely than their counterparts who did not work to live in an English-speaking household. Students who worked part-time were also more likely to have a father in a professional (16% versus 13%) and managerial occupation (37% versus 31%). This is similar to the situation described in Northern Ireland (Mcvicar and Mckee, 2001) and the US, where having parents with at least tertiary education increases the chance of part-time work whilst still at high school (Carr and Wright, 1996). Students who worked part-time at the age of 16 also scored higher on English (35 points versus 33.6 points) and mathematics tests (38.2 points versus 36 points) taken at the age of 11, indicating that it was the more able students who chose to work. This is also reflected in GCSE exam performance, where those who were employed during term time achieved a higher number of A\*- C passes in comparison to their counterparts who were not working (7.1 versus 6.5). These differences are all statistically significant. Respondents who worked were also less likely to be unemployed at the ages of 18 and 19; for example, at the age of 18, only 4% of

those who worked while at school were unemployed, compared to 6% of those who did not work, and this pattern persisted at the age of 19 (5% compared with 9%). However, respondents who worked while at school were less likely to be in post-compulsory education at the ages of 17, 18, and 19.

**Table 2: Sample means by employment status**

	No part-time job at age 16	Has part-time job at age 16	ALL
Males	0.51	0.49	0.50
Number of siblings	1.58	1.42	1.54*
Respondent thinks he/she will continue education <sup>a</sup>	0.86	0.84	0.85*
Parents think his/ her child will continue education <sup>a</sup>	0.78	0.76	0.78
English - main language at home	0.81	0.96	0.85*
<b>Social class of father</b>			
Professional	0.13	0.16	0.14*
Managerial	0.31	0.37	0.32*
Skilled manual	0.22	0.28	0.23*
Semi-routine	0.26	0.18	0.24*
Long-term unemployed	0.07	0.02	0.06*
<b>Early characteristics</b>			
Ability test score at 11	33.64	35.05	34.02*
Mathematics test score at 11	36.06	38.18	36.63*
Helping with domestic chores at 15	0.45	0.44	0.45
<b>At age 16</b>			
Achieved A*-C on English GCSE	0.65	0.72	0.67*
Achieved A*-C on Mathematics GCSE	0.60	0.68	0.62*
Total number of A*-C GCSE	6.51	7.13	6.68*
Received pocket money	0.83	0.66	0.78*
<b>Outcome characteristics</b>			
<b>At age 17</b>			
Continuing education at 17	0.87	0.84	0.87*
Employed at 17	0.05	0.09	0.06*
<b>At age 18</b>			
Continuing education at 18	0.68	0.63	0.67*
Employed at 18	0.20	0.29	0.22*
Unemployed at 18	0.06	0.04	0.05*
<b>At age 19</b>			
Continuing education at 19	0.68	0.63	0.67*
Employed at 19	0.26	0.36	0.29*
Unemployed at 19	0.09	0.05	0.08*

\*Differences are statistically significant:  $p < 0.05$ .

<sup>a</sup> Declared when a child was 15.

Based on the 1989/1990 cohort from the LSYPE, these descriptive statistics reveal statistically significant differences in personal and household characteristics and educational and labour market outcomes of those who worked part-time at the age of 16 and those who did not.

### III. Econometric specifications

This section begins with a short description of the research questions and an outline of the main estimation problems. Then a more detailed methodological approach will be presented. The main research questions are as follows:

- Does working part-time while still in compulsory education have an impact on educational achievements at the age of 16?
- Is there any relationship between part-time employment while in compulsory education and educational attainment at the age of 17?

Estimating the causal effect on later outcomes of part-time employment at the age of 16 is not straightforward for a number of reasons. First, those who decide to work part-time while at school could do this to compensate for low grades and poor performance at school. If so, the OLS estimates used to measure the impact of part-time work while at school on final GCSE grades, will be biased. This study adopts several instruments to account for this. Finding good instruments that are both uncorrelated with the error term in the regression of the outcomes of interest and correlated with the decision to work part-time is a challenging task. This study uses regional indicators measured before respondents were eligible to have a part-time job. They consist of the following:

- the number of businesses that specialise in distribution, hotels and catering, as a percentage of the total number of business sites in the region (data for 2004, Regional Trends, No. 39, 2006 edition, Office for National Statistics)
- the number of firms in a VAT register at the start of the year per 10,000 resident adults (data for 2006, Introducing the new Business Demography statistics'. Available at: <http://stats.berr.gov.uk/UKSA/ed/sa20081128.htm>),
- motor vehicle traffic measured by the number of vehicle-kilometres which refer to the distance travelled by vehicles on roads (data for 2004, Regional Trends, No. 39, 2006 edition, Office for National Statistics)
- average weekly household spending per child in the region (data for 2004, Regional Trends, No. 39, 2006 edition, Office for National Statistics)

The first two indicators are related to the employment opportunities available for the youth in their region. Distribution, hotels and catering are the main industries that rely on part-time workers, so their relatively high presence in the region has an impact on the student employment but not on the students' final GCSE exam scores. The motor vehicle traffic

indicator is a good proxy for mobility patterns and infrastructure availability. The better infrastructure is, the easier it is to commute to a potential place of work. The last indicator describes the regional average level of parental spending per child in a family. It is assumed that in the region where this amount is higher, students are less motivated to work part-time, compared to the part of the country where parental spending is lower.

Similar problems are faced when addressing the second research question, related to decisions to work part-time while still in school and to continue further education. For example, if an individual plans to withdraw from school at 16, he or she might decide to work part-time while still at school in order to gain labour market experience. In this case, part-time employment is endogenous and a result of, rather than an explanation for, the decision to leave education.

To account for this, the decisions to work part-time while at school and to leave school aged 16 are simultaneously modelled using a recursive bivariate probit estimation.

There is an additional issue of sample selection bias, which arises from non-random sample attrition in the LSYPE; this is addressed by applying inverse probability weights to all estimations.

Therefore, the first step in the analysis is to use LSYPE data to identify whether or not hours of work for part-time jobs while at school have an impact on performance in GCSE exams taken at the end of compulsory education at the age of 16. This is measured by the number of GCSEs passed with grades A\*- C. It is assumed that the number of GCSEs with grades A\*- C is equal to:

$$GCSE_i = \alpha_{GCSE} hrs_i + \beta_{GCSE} x_i + u_{GCSE_i} \quad (1)$$

where:

- $GCSE_i$  is the number of GCSEs passed with grades A\*- C at the age of 16 for individual  $i$ ,  $hrs_i$  is the number of hours per week spent in part-time employment at the age of 16 for individual  $i$ ,  $x_i$  is a vector of individual and family characteristics, and  $u_{GCSE_i}$  is random error which has a normal distribution.

First, (1) is estimated using OLS. However, if the decision on part-time employment was motivated by poor school performance, the OLS estimates are biased and inconsistent, as one of the standard assumptions of strict exogeneity is violated, and the variable indicating hours of part-time employment is correlated with the error term  $u_{GCSE}$ . To apply IV method, I define hours of student part-time work by the following:

$$hrs_i = \gamma_{hrs} z_i + \beta_{hrs} x_i + v_i \quad (2)$$

- where:  $x_i$  is a vector of individual and family characteristics,  $z_i$  is a set of regional characteristics determining hours of part-time employment at the age of 16, and  $v_i$  is an error term. IV models are estimated using GMM, as it is more efficient than the two-stage least square approach (Wooldridge, 2002).

Next, I analyse the impact that part-time employment at the age of 16 has on participation in education at the age of 17. Here, a dependent variable takes the value of one if an individual remains in any form of education at the age of 17, and zero otherwise. An individual was continuing education at the age of 17 if:

$$EDU_i^* = \alpha_{EDU} p_i + \beta_{EDU} x_i + u_{EDU_i} > 0 \quad (3)$$

where  $EDU_i^*$  is a latent variable, and the observed outcome is  $EDU_i = \begin{cases} 1 & \text{if } EDU_i^* > 0 \\ 0 & \text{if } EDU_i^* \leq 0 \end{cases}$ , and

$p_i$  indicates whether or not an individual was in part-time work at the age of 16,  $x_i$  is a vector of individual and family characteristics, and  $u_{EDU_i}$  is random error that has a normal distribution.

Moreover, I assume that part-time employment is determined in the following way:

$$p_i^* = \gamma_P z_i + u_{P_i} \quad (4)$$

where  $p_i^*$  is a latent variable with an observed outcome,  $p_i = \begin{cases} 1 & \text{if } p_i^* > 0 \\ 0 & \text{if } p_i^* \leq 0 \end{cases}$ .

$z_i$  is a vector of individual and family characteristics, and  $u_{P_i}$  is random error that is normally distributed. As explained above, there is a possibility that the decision to continue education is jointly made with the decision to work part-time while in school. For example, those students who are more inclined to join the job market immediately after leaving compulsory education might have already decided to work part-time during a school term to gain experience and prepare for full-time employment in the near future. If so, I estimate equation (3) and equation (4) jointly. I allow the error terms  $u_{EDU_i}$  and  $u_{P_i}$  to be correlated and impose the normality condition on the joint distribution of these error terms in the form of a bivariate distribution. Their covariance matrix is defined as:

$$\begin{pmatrix} 1 & \sigma_{EDUP} \\ \sigma_{EDUP} & 1 \end{pmatrix}$$

where  $\sigma_{EDUP}$  is the covariance between the error terms  $u_{EDU_i}$  and  $u_{Pi}$ . I estimate equations (3) and (4) using a recursive bivariate probit. In the result, I present the marginal effect of part-time employment, defined as the conditional probability of being in school at the age of 17 given part-time employment, minus the conditional probability of being in school at the age of 17, given no part-time job.

As non-random attrition is an issue in the LSYPE, I use inverse probability weights that control for sample attrition. This involves constructing weights that are lower for those individuals who are less likely to leave the panel in comparison to those who are more likely to leave (Baulch and Quisumbing, 2010). I describe the construction of these weights in Appendix A.

#### **IV. Empirical results<sup>5</sup>**

I first investigate the impact of part-time employment on educational attainment at age 16. Table 3 presents the OLS and IV estimates the impact of the hours of paid work during the school term on the number of GCSEs passed with grades of A\*-C. I estimate two specifications: Model 1 and Model 3 use hours worked per week at the age of 16, and Model 2 and Model 4 use the average number of hours worked at the ages of 15 and 16, respectively. The latter is motivated by the character of GCSE courses, which, in general, are taught during the last two years of compulsory education, and for this study, the time availability during those two years is crucial. All models additionally control for exam scores at the age of 11, gender, health status, number of siblings, family home ownership, access to the internet, English being the first language spoken in the household, parental attitudes towards education and parents' levels of education. I include exam scores assessed at 11 to control of cognitive ability. Additionally, I control for non-random sample attrition using the inverse probability weights in all specifications.

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<sup>5</sup> Analysis was also conducted separately for each gender. However, the direction of the impact of part-time work at age 16 remains unchanged regardless of gender, with statistical significance and subtle variation in the size of the impact. Also, a distinction was made between intensive (more than 9 hrs per week) and moderate (up to 9 hrs per week) part-time employment at age 16, including two binary variables, when not working remained base category. The results do not change considerably: intensive employment had a slightly higher impact on the analysed outcomes. However, both moderate and intensive part-time employment remain statistically significant and have the same direction.

**Table 3: The effect of hours of part-time employment on GCSE achievement: OLS, IV**

	Model 1 OLS	Model 2 OLS	Model 3 IV	Model 4 IV
Hours of work at age 16	-0.030*** (0.009)		-0.293 (0.206)	
Average hours of work at age 15 and age 16		-0.043*** (0.012)		-0.352 (0.218)
<i>Diagnostics</i>				
F statistic	n/a	n/a	12.327	16.324
Hansen's J statistic	n/a	n/a	1.667 (p = 0.644)	1.168 (p = 0.761)
N	9204	9204	9201	9201

Estimates from OLS regressions (Model 1 and 2), estimates from IV regressions (Model 3 and 4), and standard errors adjusted for school clusters. All models also include controls for English, maths test score at the age of 11, gender, number of siblings, ownership of house by family, access to the internet from home, respondent's willingness to continue education, parents' willingness for the respondent to continue education, health problems, and parents' levels of education. In Model 3 and 4, instruments for hours of part-time work at age 16 include controls for the following: regional rate of the business sites in distribution, number of VAT registered establishments per 10,000 residents, regional motor vehicle traffic, and average weekly household spending per child in the region. Standard errors in parentheses: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

I first examine the OLS estimates. They indicate that in all specifications, an additional hour of work during a school term reduces the number of GCSEs passed with an A\*- C grade. An additional hour worked at the age of 16 reduces the number of GCSE passes by 0.03, and the impact is slightly larger if I consider an average hour of work when over age 15– rather than an additional hour of work – reduces the number of GCSE passes by 0.04. These effects are statistically significant, but small. The higher impact of part-time work in Model 2 compared to Model 1 can partially arise from a smaller measurement error than while just considering working time at age 16. On average, a respondent would need to increase their weekly hours of work by more than 30 at the age of 16 to obtain one less GCSE pass at the age of 16. This is an unfeasibly large amount; the average working student spent 5 hours per week in paid employment. In the Northern Ireland, Mcvicar and Mckee (2001) found that the detrimental effect of part-time work on exam results was only present for those working more than 15 hours per week. This is in line with research by Kalenkoski and Pabilonia (2009), who found that on the day he/she worked, a student spent less time on educational activities. This is also consistent with human capital theory, which states that less time invested in formal education reduces an individual's productivity (assuming that GCSE performance measures productivity). However, it is also worth noting that this detrimental impact became visible when students worked many hours per week. It was reported by Kalenkoski and Pabilonia (2009) that those teenagers who have part-time jobs also spent less

time watching TV than teenagers who did not work, so I could conclude that if part-time employment is within reasonable weekly limits, it still leaves time for educational activity.

As I mentioned before, the OLS estimates could be biased due to endogeneity of part-time employment. Model 3 (Table 3) presents results using regional indicators as instruments for part-time job hours at 16, and Model 4 uses the same instrument but for average hours of work at ages 15-16. I first note that in both models instruments just pass an F test with an F statistic of 12 and 16 (Model 3 and Model 4 respectively). Therefore, I reject the null hypothesis that the instruments are weak. However, it is rejected with some caution, as they just overcome the threshold of 10. Having more than one instrument for part-time employment allows us to test whether the instruments are uncorrelated with the error term of the wage equation. This can be tested using Hansen's (1982) J statistic. The test assumes that one instrument is valid and then tests for the validity of all other instruments. The J statistic is equal to 1.7 (Model 3), and 1.2 (Model 4) which does not reject the null hypothesis and therefore instruments are valid. In IV estimations, the impact that a student's part-time work hours have on exam results remains negative; however, the significance is lost, and standard errors increase substantially. The new estimates suggest that one additional hour of student work per week reduces the number of GCSE passes by 0.3 (Model 3) and by 0.4 (Model 4). This is a very large impact; however, the doubts about the weakness of the instruments (indicated by the value of F-statistics) suggest that the IV estimates are not preferable to the OLS estimates.

The findings are informative for the subsequent analysis. If time spent in part-time employment while at school has a negative, albeit small, impact on educational achievement at 16, it could also have an indirect impact on participation in education at 17.

Table 4 presents results from a probit estimation, where the dependent variable is equal to one if a respondent is in any form of post-compulsory education at the age of 17, and zero otherwise. Controls for gender, the total number of GCSE passes with grades A\*- C, health problems, English being the native language in the household, and the father's and mother's level of education are also used. Model 1 includes a variable indicating whether the respondent worked part-time at 16, while in Model 2, I add an interaction term between part-time employment and the respondent's parents' attitudes towards education<sup>6</sup>. Marginal effects estimated at sample means are also presented, while I control for panel attrition using inverse probability weights in all specifications.

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<sup>6</sup> This question was asked to parents when respondents were 15 years old.

**Table 4: Educational participation at 17**

	Model 1		Model 2	
	Probit		Probit with interaction terms	
	Coeff.	Marginal effects	Coeff.	Marginal effects
Part-time at 16	-0.160*** (0.041)	-0.026***	-0.249*** (0.067)	-0.041***
Respondent wants to continue ed.	0.323*** (0.050)	0.057***	0.323*** (0.050)	0.058***
Parents want him/her to continue ed.	0.379*** (0.047)	0.067***	0.337*** (0.053)	0.059***
Part-time X parents want him/her to continue ed.			0.144 (0.084)	0.021
Log likelihood	-2969.293		-2967.777	
N	9391		9391	

Estimates from a probit model where dependent variables equal one if a respondent is in any form of education at the age of 17, and zero otherwise. All models also include controls for gender, number of GCSE passes, English being the first language at home, health problems, and mother's and father's level of education. Standard errors in parentheses: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Part-time employment at 16 has a negative and statistically significant impact on education participation. Having a job at 16 reduces the probability of attending school at the age of 17 by 2.6 percentage points (Model 1). Estimates in Model 2 indicate that if parents do not want their children to continue education, the effect of working part-time at the age of 16 is even larger (-0.041). Additionally, in both specifications, the impact of parental aspiration on child educational attainment is larger than the impact of child aspiration. Although the interaction term between part-time employment at the age of 16 and parents' educational aspiration for their children measured at the age of 15 is positive, it is not statistically significant (Model 2). This finding is somewhat similar to what was reported by Oettinger (1999), who suggests that respondents from less favourable family backgrounds are more sensitive to the negative impact of early working experiences. Estimates suggest that children of parents with lower educational aspirations are less likely to continue education if working part-time, compared to children from families with higher educational aspirations. Hence, identified part-time employment during a school term reduces the likelihood of remaining in post-compulsory education. As I control for school performance, I cannot explain this impact by the lower educational achievements, as suggested by earlier estimates. One possible explanation of this effect is that students working part-time at the age of 16 could have already made the decision to enter the labour market after compulsory schooling, and the decision to undertake part-time employment was simultaneously reached with their decision

to leave school. I investigate this further by jointly estimating models of the decision to work and to participate in education using a bivariate probit. Table 5 presents the estimates of the part-time employment coefficients, including a full set of controls and allowing for sample attrition.

**Table 5: Participation in education at 17 - bivariate probit results**

	Bivariate probit	
	Coefficients	Marginal effects <sup>7</sup>
Part-time at 16	-0.614** (0.211)	-0.022**
rho	0.277 (0.126)	
Wald test of rho=0	$\chi^2(1)=4.363$ (Prob. > $\chi^2 = 0.0367$ )	
Log pseudolikelihood	-8150.8404	
N	9377	

Estimates from a bivariate probit. The model for participation in education also includes controls for gender, respondents' willingness to continue education, parents' willingness for the respondents to continue education, number of GCSE passes, English being the first language spoken at home, health problems, and mother's and father's level of education. The model for part-time employment includes control for receiving pocket money at 16, exam scores at age 11, gender, health status, number of siblings, and English being the first language spoken in the household. The marginal effect that part-time employment at 16 has on participation in education at the age of 17 is defined as conditional probability of participating in education at 17, given working part-time, less the conditional probability of participating in education, given not working in part-time employment. Standard errors in parentheses: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

Before describing the estimates, I first discuss model diagnostics. The likelihood-ratio test, which tests the hypothesis of zero correlation between the error terms from the part-time employment equation and the equation for participation in education at 17 ( $\rho=0$ ), is statistically significant at the 5% level. From this, I conclude that the decisions are made simultaneously, and a joint model is preferred over the probit model discussed above. The estimates indicate that part-time employment at 16 has a negative effect on the decision to continue education at 17, but is a little smaller than in the single probit estimation (see Table 4). Part-time employment at 16 reduces the probability of being in post-compulsory education at 17 by 2.2 percentage points. This is in comparison to 2.6 percentage points in the single probit model (Table 4). The size of this impact is not large, and it is smaller in absolute terms than, for example, the impact of parental aspiration. In the above specification, since I am controlling for the number of GCSE passes, I cannot explain the negative impact that working at 16 has on education participation at 17 through differences in academic performance, unless the part-time work affects grades rather than the number of GCSEs.

Steinberg and Greenberger (1982) suggest alternative explanations, reporting that the employment of high school students (ages 15-17) helps develop autonomy but also diminishes their involvement in school and with family.

## **V. Summary and Conclusions**

This paper examines the impact that part-time employment during the last year of compulsory education has on subsequent school performance and educational participation in England.

Estimation from a cohort born in 1989-1990 indicates that part-time employment at the age of 16 has a small, detrimental effect on GCSE performance, while controlling for results of tests taken at the age of 11, and other family and personal characteristics. This might be explained by the time usage for working teenagers who, as Kalenkoski and Pabilonia (2009) report, spend less time on educational activities, on average, than their non-working counterparts do. This finding adds to the existing literature that has identified a similar relationship in UK studies (Dustmann and Van Soest, 2007) and other European studies (Beffy et al., 2010), but it contradicts studies from the US (D'Amico, 1984; Stinebrickner and Stinebrickner, 2003; Rothstein, 2007). It is possible that the differences arise from the different cultures and attitudes towards work in the US and in Europe. Early labour market exposure is highly valued and widely widespread in the US, but it is less common in Europe; as a result, we might expect that there are differences in motivation and behaviour among working students from the US and other countries.

I also find that those who were employed part-time during the school term have a lower probability of continuing in post-compulsory education, even when controlling for final exam results. This result is more difficult to interpret. However, Steinberg and Greenberger (1982) report that working high school students have greater autonomy and less involvement in school and with family, which could partly explain my results. Interestingly, parental aspirations play an important role in determining the educational futures of their children. My findings suggest that children of parents with lower educational aspirations are less likely to continue education if working part-time, compared to children from families with higher educational aspirations.

This analysis could be developed further by identifying more powerful instruments for part-time employment and methods to account for the reciprocal decision of part-time employment and education participation, which would lead to greater accuracy in estimates.

Also, the use of a longer panel could allow for analysis of the impact of part-time employment on subsequent labour market outcomes. By doing this, I could assess the impact of part-time employment on more extended outcomes, measured, for example, by labour market participation and wages. However, the LSYPE survey is not intended for such long maintenance, and other available panel datasets illustrate the behaviour of much older cohorts (for example, NCDS for the 1958 birth cohort).

This research does not provide obvious implications for policy in the UK. The fact that the part-time employment of students reduces their achievements at school and results in a lower probability of continuing education would suggest a policy that restricts or discourages employment of students in full-time compulsory education. However, such a solution, in light of a forthcoming increase in the compulsory education withdrawal age, and an increase of tuition fees for university education, might be unfeasible. This is because 17-18 year old students – those who face higher university fees – could decide to work to save for future educational expenses. More complex analysis of the impact of part-time employment on more extended outcomes should therefore be considered.

## Appendix: Construction of inverse probability weights

To construct weights we first estimate the model of attrition in which our dependent variable ( $atr_i$ ) is equal to one if an individual left the sample, and zero if s/he remained in it:

$$atr_i = \beta_A x_{LSYPEi1} + \alpha_A a_{i1} + error_{Ai} \quad (\text{A.1})$$

Where:

- $x_{LSYPEi1}$  is a set of family and household characteristics in the first wave (age 14), when the sample is random
- $a_{i1}$  is a set of auxiliary variables which also affects the outcome variable of interest in the LSYPE dataset (for example, being in education at the age of 17). Auxiliary variables are those which are not the main explanatory variables of the outcome of interest such that we are not interested in the estimation of the outcome conditional on  $a_i$  but only conditional on  $x_i$ . As auxiliary variables we use: age and sex of the main parent, household size, health status of the main parent, lone parents household, the number of schools the child has attended up to wave 1, and the number of times a child has moved schools in the year up to wave 1. The majority of our auxiliary variables relate to the main parent.
- $error_{Ai}$  is an error term, normally distributed.

Then we estimate the restricted equation without auxiliary variables:

$$atr_{Ri} = \beta_{RA} x_{LSYPEi1} + error_{RAi} \quad (\text{A.2})$$

Finally, we construct a ratio of predicted values from equation (A.2) and equation (A.1), which we will use as the inverse probability weights:

$$Wi = \frac{p^R}{p^U} \quad (\text{A.3})$$

Where  $p^R$  is a predicted value from restricted equation (A.2) and  $p^U$  is a predicted value from unrestricted equation (A.1). We apply these weights to our main regression of interest, giving lower weights to individuals who are less likely to leave the panel. As argued by Fitzgerald et al., (1998), this application of weights leads to a gain in consistency of estimators, and is unrelated to the use of survey weights which have a different aim and adjust for sample stratification.

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