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Part-Time Work, School Success and School Leaving

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Part-Time Work, School Success and School Leaving.

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Abstract

This paper analyses the labour supply decisions of a cohort of 16 year-olds who were born in 1958 in England and Wales. It traces through the effects of part-time employment by teenagers still in full-time education on subsequent academic performance and school leaving decisions within a three equation structural model. Our results show that part-time work, educational attainment and school leaving decisions are all related to each other. Our analysis examines the impact of a wide range of variables on these events. We find, for instance, that class size not only affects exam performance, but has also an impact on school leaving decisions.

Keywords: Teenage labour supply, educational attainment, training.

JEL-Classification: C35, I20, J24

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1 Introduction

In Britain, the age of 16 marks an important milestone in the lives of young people who, at this point in their lives, face a series of significant educational and labour market choices. One decision facing 16 year olds still in full-time education is whether they should work part-time or not.[1] The age of 16 also represents the time that pupils sit their first set of public examinations, the results of which can be crucial in determining eligibility for further education and career success. Yet another choice facing the teenager is what they should do after completion of their compulsory full-time education. Should they remain in school, go into training or join the full-time labour market?

Given the importance of the choices made at 16, it is not surprising that part-time work, academic success and school-leaving decisions have been the focus of previous literature. Sly (1993) found that, according to the 1992 Labour Force Survey, one third of 16 and 17 year olds in full-time education had a part time job. Micklewright, Rajah and Smith (1994) and Dustmann, Micklewright and Rajah (1995), using data from the Family Expenditure Survey (FES) and the National Child Development Study (NCDS) respectively, also found a similar pattern of teenage working habits repeated in their analyses. Studies based on US data indicate that the phenomenon of part-time work amongst those in full-time education is not exclusive to the UK. For instance, Griliches (1980) analyses different data sets for the years 1966 and 1974 and finds that at least fifty percent of all high school graduates worked and studied simultaneously.

The factors affecting levels of educational attainment have also been the subject of empirical analysis. Studies have typically tended to address the question of whether levels of educational attainment can be explained by differences in school quality or whether they are more attributable to differences in individual characteristics and parental inputs. Steedman (1983) concluded that once differences in initial attainment and family background before the age of 11 had been corrected for, 16 year olds in comprehensives did no better or no worse in public examinations than their counterparts in selective schools. The use of different measures of academic performance, such

[1] British employment legislation allows limited participation in the labour market by children as young as 13. See MacLennan et al (1985) for a description of the legal framework.

as results obtained in standard assessment tests for reading and mathematics yields a similar picture. According to Robertson and Symons (1990) there appears to be a strong relationship between the measured ability of children, fathers' occupational status, parental education and the type of school attended.

Finally, concerns relating to the low proportion of British teenagers remaining in education beyond the minimum school leaving age have prompted a range of studies examining the staying-on decision. Rice (1987), Micklewright, Pearson and Smith (1990) and Micklewright (1989) all examine the underlying factors which influence the school leaving decision. Similarly, policy concerns have arisen because of the low number of teenagers enrolling on further training courses. Booth and Satchell (1994) analyse this in a study which examines the factors affecting the take up of apprenticeships.

But although teenage labour supply, school performance and school-leaving decisions have all individually been the subject of intensive and rigorous empirical examination, any possible links amongst the three activities have tended not to have been taken account of to any large extent. There are a number of studies that have considered, for example, the effects of part-time work by those still in school on educational and occupational expectations (Griliches, 1980), as well as its impact on subsequent wage rates (Ehrenberg and Sherman, 1983). Although interesting and informative, they have tended to overlook the significant possibility that decisions to work part-time, school performance and educational and occupational choices may be simultaneously determined.

A priori, the relationship between working part-time while still in full-time education on the school leaving decision is unclear. On the one hand, working and studying at the same time may be an indication that the teenager wishes to join the labour market as soon as possible. On the other, it may provide the young person with first-hand information about the negative aspects of jobs which are available for low skilled labour, and this may discourage the teenager from entering the full-time labour market. Similarly, school performance is likely to be affected by hours worked, and one would expect a negative correlation between hours worked at 16 and examination success. In turn, success in public examinations at 16 will have some bearing on the decision to continue with schooling beyond the minimum leaving age, particularly if schools require pupils to have achieved a certain educational standard before allowing them to proceed any further. Thus, hours worked at 16 may have a direct effect on school leaving decisions, as well as an indirect effect through examination results.

Inspection of data from the NCDS on part-time work, academic success and school-leaving supports the idea that they may be interrelated. Furthermore, there is evidence to suggest that working part-time will have important effects in the long term through its impact on future labour market outcomes. Table 1a shows the relationship between whether an individual worked part-time or not whilst still in full-time education and subsequent examination performance and patterns of economic activity. These cross tabulations suggest that individuals who worked part-time were less likely to pass any public examinations at the age of 16 relative to their counter-parts who did not work. Similarly, 16 year olds who concentrated solely on their education at the age of 16, not seeking part-time employment while they were in school, were more likely to continue with their schooling beyond the minimum school-leaving age. Surprisingly, teenagers who worked part-time while they were still at school were more likely to participate in training schemes on leaving school than enter the labour market. The relationship between working part-time and future labour market outcomes in terms of wage rates is somewhat less clear, although the data suggests that teenagers who worked part-time were paid more at the age of 23 than their counterparts who had no part-time employment. Information on wage rates at 33, however, suggests a reverse in this pattern, with individuals who had worked being paid less than those who had not.

[Table 1a,b about here]

Analysis of economic activity beyond the minimum school-leaving age disaggregated by the number of examinations passed at 16 (Table 1b) reveals, as expected, that teenagers who passed no examinations were less likely to remain in school and more likely to enter the labour market. Nearly 90% of 16 year olds who passed 7 or more examinations at 16 remained in school. The relationship between these three activities as suggested by the numbers in table 1 could be misleading, however, since they are unconditional on any other determinants.

In this paper we incorporate the observed links between working part-time, school performance and school leaving decisions into a three equation model based on data taken from the third and fourth sweeps of the NCDS. The first equation explains variations in hours of work supplied on a part-time basis by 16 year olds who have yet to complete their compulsory full-time schooling. The second equation explains a measure of examination success at 16. The third equation explains the school leaving decision. In contrast to earlier studies we differentiate between those 16 year olds who leave school to enter the labour force and those who leave to go onto to further training. This is an important distinction since a large percentage of school leavers do not enter the labour market immediately.

A second feature of our analysis is that we model the part-time labour supply of 16 year olds still in school, examination performance and school-leaving simultaneously. We allow the number of hours worked to affect both examination results and the school leaving decision. We also allow examination performance to influence school leaving. We further model explicitly the correlation between the error terms of the three equations. One advantage of this structural approach is that we are able to include actual measures of examination performance in the school leaving equation instead of using a proxy measure of test scores obtained in standardised assessment tests (see Micklewright (1989)).

Thirdly we draw on school quality information in the NCDS which has not (to our knowledge) been exploited in this context. In particular we examine the impacts of class size on levels of educational attainment and school leaving. Although the effects of rising class sizes have been studied over the past three decades (see Coleman (1966), Davie (1971), Card and Krueger, (1992)), the possible correlation between pupil-teacher ratios and academic performance remains a key policy concern. We show that class size not only has an effect on the overall performance of pupils, but also, on the decision on whether or not to stay on at school. This last point has not attracted a great deal of attention in the past, although it clearly has potentially significant implications for education and training policy. We are also able to show the impact that differing school types have on academic performance and school leaving decisions. In particular, we examine the effect of selective and non-selective schools on children's educational success.

The paper is structured as follows. In the next section, we discuss the data used for the estimation. In section 3, we present the model and discuss identification. Section 4 discusses the results, and section 5 concludes.

2 Data and Variables

We base our analysis of participation, school success and school leaving on data taken from the NCDS, which followed a cohort of individuals born during 3rd - 9th March 1958 (see Micklewright (1988) for a detailed description of the data). Of particular interest is the data recorded in the third and fourth sweeps of the survey (NCDS3 and NCDS4) and information collected in the Public Examinations Survey (PES), a follow-up survey to NCDS3. NCDS3 was conducted in the Spring of 1974, and records extensive information about the respondents, such as educational and physical development, aspirations for the future, spare time activities etc., as well as much of the usual information gathered in household surveys. A similar range of information was also gathered for NCDS4, occurring in 1981 when cohort members were aged 23, as well as further details covering education and employment experience.

Dependent Variables

As part of NCDS3 individuals were asked whether they had a regular part-time job during term time and how many hours they worked per week, with the responses being recorded in a banded form. We use this information to construct a measure of weekly hours worked while still being in full time education.

The timing of NCDS3 in Spring 1974 means that we observe the cohort members when they are still in full-time compulsory secondary education and just a few months before they sat their first set of public examinations, O' levels and Certificates of Secondary Education (CSE's), in June 1974. On the basis of the information recorded in NCDS3 alone we are unable to determine how the cohort members performed in their examinations, nor whether they decided to leave school at the first available opportunity (June 1974). Fortunately, the PES conducted in 1978 has detailed information on the examination results of some 95% of respondents to NCDS3, obtained from the schools that the NCDS children attended. We take as our measure of academic success the number of Ordinary level (O'level) passes achieved by the NCDS cohort members by 1974.[2]

[2]In 1974, two sets of public examinations were in existence - Ordinary level examinations and

For information on school leaving decisions, we draw on NCDS4. As part of NCDS4, respondents completed a month-by-month diary which recorded their economic activity from May 1974 through to January 1982. We use the information recorded in February 1975 to see whether the cohort members had, at the end of their sixteenth year, decided to continue with full-time school, or whether they had gone on to do some form of training.[3]

Explanatory variables

It is useful to distinguish various sets of variables which affect the school leaving and the hours worked decisions as well as examination success. The first set may be referred to as parental and family background variables. These comprise the number of older and younger siblings, labour market status and occupational level of the parents, the parents' educational level and the income of the household.[4] We also include a measure of the 16 year-old's ethnic origin in this category.

The second set refers to the child's school background. In the empirical analysis, we use variables which specify the type of school that the 16 year old attended in 1974. During the early 1970s, the tripartite selection-based system of grammar schools, secondary modern schools and technical schools was still being used in many local authorities in addition to mixed ability comprehensives, and so we include dummy variables to reflect these school types. To give a further indication of the quality of education that 16 year-olds received we also include a variable which measures the

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Certificates of Secondary Education (CSEs). For O' levels candidates were graded on a scale of A - E where C and above was considered a pass. For CSEs, results were graded from 1 to 5 and a Grade One was considered to be an O'level equivalent. We therefore use the term O level to include CSE Grade One passes.

[3] We classify all those who have any element of training associated with their job as being in the "training" category, in addition to those enrolled on full-time training schemes. Thus, for example, an individual in part-time employment and on an apprentice scheme would be classed as being in training, as would some one who was simultaneously on a government training scheme and in part-time education.

[4] The income information in NCDS3 is recorded in a banded form. We constructed a continuous measure of income, taking into account all sources of household income, following Micklewright (1986).

pupil-teacher ratio in the school that the cohort member attends.[5] Inclusion of this variable will give some indication of the extent to which increasing class sizes may lead to a lowering of educational standards.

A third set of variables measures the parents' interest in the respondent's school work and the parents' intentions about their offspring's further educational career. Here we use a variable which reflects the opinion of the teacher on whether the parent is concerned about the teenager's school performance, and variables which indicate whether the parents want the teenager to complete Advanced levels (A'levels) or to follow a University education.

A final set of variables are the results obtained from the attainment tests in mathematics and reading comprehension that respondents sat the ages of 7, 11 and 16. These have been used extensively in a number of studies. Micklewright (1988) included a variable based on scores achieved in attainment tests taken at 16 as a proxy for examination performance, thus avoiding the problem that academic success at 16 could be endogenous to the school leaving decision. Likewise, Dustmann, Micklewright and Rajah (1995) used test scores at 11 in their study of the determinants of part-time work for teenagers still at school, as did Robertson and Symons (1995) who analysed the occupational choice of British children.

One question that arises with the test scores is which is the most appropriate set of measures? For the purposes of this study, it would be desirable to find some combination of the attainment scores that reflected the underlying ability of the participant rather than just their performance in reading and mathematics tests. It is for this reason we include combined tests scores at the age of 7 in all three equations, on the grounds that measures of attainment at 7 are likely to be the closest proxy for the underlying ability of teenagers since these are less 'contaminated' by parental attention, quality of schooling and other factors which will determine how well a child will perform in school tests. Furthermore, the results of test scores at 7 clearly avoid any potential endogeneity problems that could arise with the test results at 16 if it is believed that teenagers who lack academic motivation are more likely to drop out of school early.

[5]This variable is derived using information on the total school roll divided by the number of full-time equivalent teachers.

We also include a measure for the general economic situation the teenager faces out of the school system. We construct a variable which quantifies the youth unemployment rate for the area that the respondent lives in. More specifically, we use the regional unemployment rate amongst school leavers in summer 1974, which reflects the level of demand for school leavers.

[Table 2 about here]

The data set used for estimation is based on a sub-sample of 3,427 cases out of possible 11,602 who were traced at NCDS3, PES and NCDS4. Unfortunately, differences in the educational system in Scotland restricted our analysis to those teenagers living in England and Wales. A more significant factor was the problem of missing or incorrectly recorded information which contributed to the exclusion of some 7,000 observations from our data set. Information collected at the third sweep was retrieved from four separate sources (from the cohort member, from his or her parents, from the school that the 16 year olds attended and from the teenager's doctor) and for a number of respondents there was failure to complete one or more of the questionnaires.

Table 2 shows the means for all the variables used in our analysis, for both the male and the female sample, together with brief variable definitions.

3 The Econometric Model

For each individual, we explain hours worked part-time prior to leaving school, the number of O'levels passed during 1974 and the 16 year old's choice of activity once he or she is no longer in compulsory full-time education.

We have categorical information on hours worked, with seven categories (see Table 1a). Because the bounds of the categories are known, it seems reasonable to use a grouped regression model:[6]

$$H^* = X_H\, \beta_H + u_H; \;\; H = 3j \;\text{ if }\; m_{j-1} < H^* \leq m_j\,, \qquad (1)$$
$$m_{-1} = -\infty,\; m_j = 0.5 + 3j \;\; (j = 0, ..., 5)\,, \;\; m_6 = \infty.$$

[6]For notational convenience, the index indicating the individual is omitted throughout.

Here H denotes the hours category, multiplied by three to make the scale comparable to that of actual hours worked per week. H^* is a latent variable. X_H is a vector of explanatory variables. We specify the hours equation as a reduced form equation, and thus the vector X_H contains all variables in the model.[7] The distribution of the error term u_H is discussed below.

The dependent variable in the exam equation is the number of O'level passes obtained at age 16 (see section 2). Since this number is zero for about 50 percent of all individuals, we model it as a censored regression equation:

$$E^* = X_E \, \beta_E + \gamma_E \, H + u_E \, ; \quad E = \max(E^*, 0) \, . \tag{2}$$

Here E denotes the number of O'levels, E^* is a latent variable, X_E is a vector of explanatory variables, and u_E is an error term. Notice that we explicitly allow exam success to depend on hours worked when attending school. Parental and family background variables may have an effect on the O'level performance of the teenager. We include in the examination equation all variables which represent the parents' occupational group or measure the level of education of the parents. Educated parents are more able to help their children with their school work, and they may also provide a more stimulating intellectual environment. We also expect parents who are in higher occupational groups or have a stronger educational background to care more about how well their children perform at school. This effect should be reflected by the variables which document the interest of the parent in the teenager's education.

Another important variable which has been the subject of analysis in earlier studies is the number of older and younger siblings. Behrman and Taubman (1986) show that not only parental characteristics, but also the birth order has a significant effect on school success. A priori the signs of these variables are not completely clear. In an environment of perfect certainty where parents plan the number of children they want at an early stage, Becker's theory on the quantity and quality of children (Becker, 1991; Becker and Lewis, 1973; Willis, 1973) suggests that the time parents allocate to each child is decreasing with the number of siblings. One should therefore expect both the

[7] Information on hours worked was gathered during the Spring of 1974, at least three or four months before respondents took their O'levels and were able to leave school.

number of older and the number of younger siblings to have a negative sign in the exam equation, since both indicate a decrease in parental input. However, if the birth order is also important (see Hanushek (1992)), one might expect different signs for the older and younger sibling variables.

Finally, we include the variable that measures the child-pupil ratio in the school that the teenager is attending. We expect this variable to have a negative sign. However, as this ratio may also be reflected by school type variables, its effect may simply be wiped out by school dummies. We therefore estimate the examination performance equation with and without school type variables.

The choice between continuing full-time education ($C = 0$), going into a training programme ($C = 1$), and entering the labour force ($C = 2$) may be viewed as inversely ordered by the amount of education involved. For this reason we use an ordered response model.

$$C^* = X_C\,\beta_C + \gamma_C\,H + \delta_C\,E + u_C, \tag{3}$$
$$C = 0 \text{ if } C^* < 0,\; C = 1 \,\text{if}\, 0 < C^* < m_C,\; C = 2 \text{ if } C^* > m_C\,.$$

Here C^* is a latent variable, X_C is a vector of explanatory variables, and u_C is an error term (with variance normalized to one). The index C^* depends on hours worked when 16, and on the exam success, with γ_C and δ_C being the respective coefficients. In the standard ordered probit model, the category bound $m_C > 0$ is estimated as an additional parameter. However, to add more flexibility to the model, we allow m_C to depend on all explanatory variables in the equation:

$$m_C = exp(X_C\,\beta_m + \gamma_m\,H + \delta_m\,E)\,. \tag{4}$$

This leads to a model with the same degree of flexibility as the multinomial logit model, in which the alternatives are not ordered (cf. Pradhan and Van Soest (1995) for a comparison of the two in a similar framework). In X_C, we include the number of younger and older siblings.

A variable which has been neglected in earlier studies of school leaving decisions is the child-teacher ratio. High pupil-teacher ratios are not only likely to have a negative impact on academic performance, but also might be correlated with higher school leaving rates if larger classes lead to less academically motivated pupils. Furthermore, poorly resourced schools will be unable to offer adequate career's advice and guidance, which again will discourage teenagers from continuing in education or training beyond the age of 16. Other variables which we include are the interest the parents express in the child's school performance, and the aspirations of the parents concerning the child's future education. Again, we estimate this equation with and without the school type variables, for similar reasons as those given earlier.

Distribution of Error Terms and Identification

The vector of error terms $u = (u_H, u_E, u_C)'$ is assumed to be independent of all explanatory variables in X_H, X_E and X_C and multi-variate normal with mean zero and covariance matrix Σ. By means of normalisation, $\Sigma(3,3) = Var(u_C)$ is set equal to one. If $\Sigma(1,2) = 0$, hours are exogenous in the exam equation. Similarly, if $\Sigma(1,3) = \Sigma(2,3) = 0$, hours and exam results are exogenous for the school leaving decision. We present results for a diagonal matrix Σ and for the general case without restrictions on Σ.

To allow the error terms to be dependent, we have to make some identifying restrictions. We exclude the local unemployment rates from the examination success equation. It could be argued that if the teenager is forward looking, then he or she might work harder in their exams taken at 16 if there is a low probability of finding employment on leaving school. On the other hand, forward looking behaviour of this kind would require detailed information on labour market conditions which might not necessarily be easily accessible to 16 year olds still in full-time education. We further exclude the variable which measures parental income since its indirect impact on exam success is already controlled for by the school type variables, the occupational level and the interest the parents express in their child's school work.

From the school leaving equation, we exclude the occupational and educational status of the parents. In the examination performance equation these variables should reflect not only the interest of the parent in the teenager's academic performance, but also the ability of the parent to help the child with homework etc. In the school leaving equation, however, these variables should only reflect the wishes of the parents that the child proceeds into higher education, but we already condition on explicit measures of these intentions (variables PARALEV, PARUNIV and PARINT).

In Table 2, those variables which are excluded from the exam equation are marked with superscript "^{E}"; those variables which are excluded from the school leaving equation are marked with superscript "^{L}".

If Σ is diagonal, the three equations can be estimated separately by maximum likelihood. If Σ is not diagonal, however, separate estimation results in inconsistent estimates of exam- and school leaving equation. The three equations are therefore estimated jointly by maximum likelihood. Simpler two stage estimators for the exam equation and the school leaving equation are not available in this case. The likelihood contribution of each individual is either a trivariate normal probability (if $E = 0$), or a univariate density multiplied by a bivariate normal (conditional) probability if $E > 0$. See Appendix for details.

4 Results

We estimate and compare a variety of different specifications. Based on likelihood ratio tests, we come to the following conclusions: First, pooled estimation of males and females with different intercepts between both groups is rejected in favour of separate estimation. Secondly, the ordered probit specification of the school leaving equation is rejected in favour of the specification which allows for flexible thresholds. Thirdly, specifications which do not allow for correlation in the error terms cannot be rejected against the general specification. And finally, models in which hours worked enter linearly can not be rejected against models where hours worked enter nonlinearly in exam- and school leaving equations, using dummies for the hours categories.

We report three specifications. Model Ia is the most general one, where error terms between equations are free. Model Ib restricts the correlation between the error terms to be equal to zero - this corresponds to separate estimation of the three equations. This assumptions affects size and significance of the parameters γ_C, δ_C, and γ_E. Finally, model IIa allows the error terms to be correlated, but excludes school type variables.

We first discuss the parameters estimates for the endogenous variables (hours worked in the exam equation, and hours worked and exam success in the school leaving equation). Table 3 presents results for the hours equation, and Tables 4 estimates for the exams equation. Table A1 reports estimates for the school leaving equation, and Tables 5 and 6 the corresponding marginal effects for models Ia and IIa.

Consider first the exam equation (Tables 4). Comparing the models Ia and Ib leads to the following conclusions. The effect of hours worked on exam success is negative and significant in specifications which do not allow for correlation between the errors (models Ib). Estimates indicate that a ten hour increase in part-time work reduces the number of O'levels by 0.49 for males and 0.22 for females; the effect for females, however, is not significantly different from zero. If we allow for correlation in the error terms (models Ia), the effects turn insignificant for both males and females. The estimated correlation coefficients $\rho(1,2)$ are not significantly different from zero either. Apparently, our identifying restrictions are too weak to distinguish between the two specifications. Still, the results emphasize the importance for allowing hours worked to be endogenous in the exam success equation.

For the school leaving equation, we only discuss the marginal effects, since they are easier to interpret (see appendix for calculation of the marginal effects and standard errors). The results for the models Ia and Ib, to which we confine our discussion here, are summarized in Table A2. When restricting the correlation between the error terms to zero (models Ib), we find that the number of hours worked affects the decision to stay on at school negatively for both males and females, but only for males is the effect on the edge of significance. Hours worked have a positive effect on entering a training scheme for both males and females. The dummy variables retain their signs, but turn insignificant, if we allow for nonzero correlation coefficients (models Ia). The estimates of the correlation coefficients $\rho(1,3)$ are insignificant as well. Again, we therefore cannot distinguish between a systematic effect of hours worked and unobserved heterogeneity. However, the effect of hours on this decision is moderate in any case.

Endogenizing the exam results only slightly reduces the size of the effect of this variable on the school leaving decision, and the estimates remain precise and significant. According to the general model Ia, an increase by one in the number of O'levels passed increases the probability of leaving school and joining the labour market by 5.9 and

4.5 percent for males and females, respectively. It increases the probability of staying at school by 6.6 percent for males and 4.6 percent for females. The effect on joining a training scheme is insignificant for both.

We conclude from these results that working part time while attending school is unlikely to have a notable effect on exam success. Furthermore, the effect of part time work on the school leaving decision is likewise moderate, and the effect is not significant in the more general model. Labour force participation while attending school seems therefore to play a minor role for both these events. In contrast, exam success does affect the school leaving decision strongly. While it reduces the probability that the individual joins the labor market, it increases the probability that the individual stays on at school. The effect on joining a training scheme is not significant.

Looking specifically at each equation in turn, we now examine the impact of the other variables. Table 3 presents the hours equation for both males and females. We specify the hours worked equation as a reduced form equation. Only the results for the most general model (model Ia) are reported. Since the model is a grouped regression model, we can interpret the coefficients as marginal effects on hours worked. For both males and females, the number of younger siblings has a strong positive effect on the number of hours the teenager works, while the number of older siblings is insignificant. One explanation is that individuals have to compete with younger siblings for the financial resources parents are able to allocate between them, while older siblings are financially more independent.[8]

Most indicators for parents' occupational status and skill level are insignificant, with one exception - the variable which indicates that the father owns or works on a farm, which affects the labour supply of males positively. The mother's participation in the labour market has a positive effect on both males and females (although not significant at the five percent level for males). One reason may be that women often work in positions where there are part-time work opportunities for their off-spring. The variable which indicates that children have a non-European ethnic background is negative for both males and females, but significant only for females. This may reflect different habits and ideas about the role of female children inside the family.

[8] See also Dustmann, Micklewright and Rajah (1995) for the relationship between part-time work of teenagers and intra-household transfers.

The school types have the expected sign. The base category includes teenagers attending secondary modern or technical schools (lower ability state run schools). Teenagers attending independent (selective non-state run schools) or grammar schools (higher ability state run schools) are likely to work fewer hours than those in the base category. One reason for this is that the GRAMMAR and INDEP dummies may simply be proxying factors such as motivation levels of the teenager or other socioeconomic influences not picked up by the other explanatory variables. Alternatively, it may be that the 16 year olds who go to independent or grammar schools have less free time to work part-time; they might be given more homework, be more involved in extra-curricular activities or may have to travel further to attend school. Children attending comprehensive schools (mixed ability state run schools) also tend to work fewer hours but the coefficient for COMP is less negative than those for GRAMMAR and INDEP. Not surprisingly, children attending special needs schools are unlikely to work. While we would expect a negative income effect on theoretical grounds, family income appears to be insignificant.

Finally, we include variables which relate to school performance, but may have an indirect effect on hours worked. If the parents want the teenager to go to university (PARUNIV), the teenager might work fewer hours and devote more time to studying. Interestingly, the effect of this variable is strongly significant for males, but insignificant for females. Ability has a significant and positive effect on hours worked for both sexes, perhaps because higher ability teenagers need to spend less time studying (controlling for differences in school type) and can spend more time working.

Tables 4a and 4b present results of the examination success equation for males and females respectively. Results on models Ia, Ib and IIa are reported.

[Tables 4 about here]

An interesting result that emerges from the analysis is the coefficient for the variable CTRATIO, which measures the pupil-teacher ratio in the school that the child attends. Conditional on school types, the estimates are negative, but insignificant for both males and females. It is likely, however, that CTRATIO and the school type variables are closely correlated. If we exclude the school type variables (models IIa), the effect of CTRATIO remains negative, but becomes strongly significant. For those who obtain O'levels, an increase of the pupil-teacher ratio by ten decreases the expected number of O'levels by about 1.4 for males and 1.8 for females. These results are in line with US studies. For example, Finn and Achilles (1990) found that reductions in the pupil-teacher ratio for elementary school students significantly increased test scores in reading and maths examinations. Our findings, therefore, lend weight to the argument that increasing class sizes can have a large and negative impact on school performance.

Inclusion of the school type variables also gives rise to results which have potentially important policy implications, given the highly controversial debate in the UK surrounding the merits of selective versus non-selective schools. We find that the type of school that the teenager attends has a significant impact on academic performance, even when differences in family background have been controlled for. In particular we find that children at independent and grammar schools perform significantly better than their counterparts in non-selective state run schools. Furthermore, attendance of a single sex school influences exam performance for females significantly positive, while the effect on male performance is negative, but insignificant. These findings are consistent with the idea that whilst teenage girls tend to perform more strongly in a single sex environment, teenage boys do not.

The dummy variables reflecting parental interest in the teenager's education and future prospects (INTPAR, PARUNIV and PARALEV) are all strongly significant, with the expected signs. The estimates indicate that these parental attitudes have a considerable effect on the child's performance. According to estimates in columns 1 and 3, the fact that the parents want the teenager to take A'levels increases the number of O'levels by about one. If the parents want the 16 year old to attend university, the number of O'levels increases by about 3 for both males and females.

The effect of father's and mother's educational background (PAAGEFT, MAAGEFT) on the child's success is likewise quite strong and significant for both samples. Since we condition on indicators which express the parents' interest in the child's academic performance as well as on the child's ability, these variables may reflect the quality of parental input. The ability measure (ABLE7) has the expected positive sign and is strongly significant. Based on columns 1 and 3, an increase in test scores by 10 raises the number of O'levels by 0.67 for males and 0.96 for females. For both males and females the number of older and younger siblings affects exam success negatively, with older siblings being more important. This result supports Becker's (1991) hypothesis about a trade-off between the quantity and quality of children, and suggests that parental attention is reduced as family size increases. Furthermore, and particularly for males, parental attention seems to be unevenly distributed, with most being given to older children, confirming Hanushek's (1992) finding that the birth order plays an important role for childrens' academic performance.

Results presented for the school leaving equation refer to the ordered probit specification where the threshold parameter is allowed to vary among individuals. Estimation results are presented in Table A1, and marginal effects on the probabilities of the three outcomes for the average male and female in Tables 5 and 6. Here both the direct effect on C^* and the indirect effect through the threshold m_C are taken into consideration (see equation (4), and appendix for details). Again, the most general specification and the specification which excludes school types and imposes zero correlations are presented. The first column presents the effect on the probability of remaining in school, the second and third on the probabilities of choosing some training programme and entering the labour market.

The most striking finding is that the pupil-teacher ratio has a significant and negative effect on the probability of staying on at school, irrespective of whether the school type variables are included or not. If we do not condition on school type variables (Tables 6), we find that an increase in the CTRATIO by 10 decreases the probability of remaining in full-time education by 13 percentage points for males, and by 20 percentage points for females. The effect remains the same for males if school types are controlled for. For females the effect remains negative, but decreases in size and significance level. Thus not only does class size affect the academic performance of children negatively, it also has a strong influence on future career choices. Looking only at the immediate effect of this variable on the performance of teenagers would lead to an underestimation of the total impact of larger class sizes on educational outcomes. This result lends support to earlier findings by Card and Krueger (1992), who use state level data for the U.S. They find that a decrease in the pupil-teacher ratio increases the average length of education.

Conditional on exam success, some school type variables retain an effect on the school leaving decision. Not unsurprisingly we find that teenagers attending grammar or independent schools are more likely to remain in school beyond the age of 16, even when performance in O'levels is controlled for. Here, the school type dummies may be capturing a number of effects such as the quality of careers' guidance that may be available in schools of varying types. For example, peer pressure in grammar or independent schools may discourage teenagers from leaving school at the first possible opportunity. Furthermore, specialist staff employed to give informed advice about education and career choices may have a bearing on school–leaving decisions.

The variables reflecting the interest of the parent in the teenager and the desire of the parent that the child continues education are strongly significant, with the expected sign. Parental aspirations that the child attends university or achieves A levels increases the probability of remaining at school for males by 35 and 25 percentage points respectively. For females, the wish of the parent that the child aims for a university education increases the probability of remaining at school by 41 percentage points. These large effects suggest that even at age 16, parents can have a strong influence on the child's educational career.

While the effect of the number of O'levels passes obtained seem to be the same for males and females (see discussion above), the effect of the ability variable on remaining at school for males increases the probability of remaining in full time education, and decreases the probability of joining the labour force full time for males. The effect on training scheme participation is not significant.

On the other hand, for females, the ability variable positively influences the decision to participate in training, but negatively influences the decision to join the labor force. Its effect on the decision to remain in full-time education is insignificant. This may reflect the fact that traditionally teenage girls have been pushed towards certain careers requiring vocational or other types of training (e.g. nursing or secretarial jobs), irrespective, to a certain extent, of their ability levels or their academic performance.

5 Conclusion

We find that working part-time has a significant negative impact on examination results only if we do not allow for correlation of error terms. Teenagers who worked part-time are also more likely to leave school at the age of 16. These effects are significant only if we allow for no interactions in the error terms. From a policy perspective, we conclude therefore, that working part-time does not necessarily have adverse impacts on school performance nor does it particularly encourage early school-leaving. Furthermore, we find that strong examination performance at O'level considerably influences the school leaving decision for both males and females.

The study sheds some light on an issue which has been subject to much debate - the impact of rising class sizes on school performance. We find that there is some evidence to support the view that pupils in larger classes perform less well than those children who are taught in smaller groups, even when differences in parental occupational group, differences in ability levels and family composition have been accounted for. More significantly, we conclude that the impact of rising pupil-teacher ratios is perhaps much more important than previously thought, since we find that teenagers in larger classes tend to drop out of school earlier than those in smaller classes. This effect prevails even when controlling for school types. Thus, an increase in class sizes is likely to have effects far larger than just those on educational performance, if the more long term issues are considered. In view of recent cuts to the education budget, this finding calls into question claims that educational performance is not affected by class sizes. We also find that children in independent and grammar schools tend to out-perform their counter-parts in non-selective schools, even when differences in family background and individual characteristics are taken into account.

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7 Appendix: Likelihood Contributions and Marginal Effects

We only consider present the likelihood contributions of individuals with $C = 1$. Likeli- hood contributions of those with $C = 0$ or $C = 2$ are very similar. We distinguish two cases:

I. $H = 3j$; $E = 0$; $C = 1$.

The likelihood contribution is given by

$$\begin{aligned} L &= P\{m_{j-1} < H^* < m_j,\ E^* < 0,\ 0 < C^* < m_C\} \\ &= P\{m_{j-1} - X_H\,\beta_H < u_H < m_j - X_H\,\beta_H,\ u_E < -X_E\,\beta_E - \gamma_E\,H, \\ &\qquad -X_C\,\beta_C - \gamma_C\,H < u_C < m_C - X_C\,\beta_C - \gamma_C\,H\} \end{aligned} \tag{5}$$

This can be written as a linear combination of four trivariate normal probabilities. For m_C, the expression on the right-hand side of (4) can be substituted.

II. $H = 3j$; $E = E^* > 0$; $C = 1$.

Let $e_E = E - X_E\,\beta_E - \gamma_E\,H$, the residual in the exam equation.

The likelihood contribution is given by

$$\begin{aligned} L &= f_{E^*}(E)\ P\{m_{j-1} < H^* < m_j < 0, 0 < C^* < m_C|E\} = \\ &= f_{u_E}(e_E)\ P\{m_{j-1} - X_H\,\beta_H < u_H < m_j - X_H\,\beta_H, \\ &\qquad -X_C\,\beta_C - \gamma_C\,H - \delta_C\,E < u_C < \\ &\qquad m_C - X_C\,\beta_C - \gamma_C\,H - \delta_C\,E|\ u_E = e_E\} \end{aligned} \tag{6}$$

Here f_{E^*} and f_{u_E} are the univariate normal densities of E^* (conditional on exogenous variables) and u_E. The conditional probability in (6) is a bivariate normal one. We use the BFGS algorithm in GAUSS to maximize the likelihood, and computed the standard errors from the outer products of the scores.

Marginal Effects School Leaving Equation

The marginal effects presented in Tables 5 and 6 are computed as follows, using (3) and (4). For notational convenience, we write $Z_C = (X_C, H, E)$, $\theta_C = (\beta_C', \gamma_C, \delta_C)'$, and $\theta_m = (\beta_m', \gamma_m, \delta_m)'$. We then have

$$\frac{\partial P[C = 0|Z_C]}{\partial Z_C} = -f_{u_C}(-Z_C\theta_C)Z_C, \tag{7}$$

$$\frac{\partial P[C = 1|Z_C]}{\partial Z_C} = f_{u_C}(-Z_C\theta_C)Z_C + f_{u_C}(m_C - Z_C\theta_C)(m_C - 1)Z_C, \tag{8}$$

$$\frac{\partial P[C = 2|Z_C]}{\partial Z_C} = f_{u_C}(m_C - Z_C\theta_C)(1 - m_C)Z_C. \tag{9}$$

The marginal effects in Tables 5 and 6 are those computed for the sample average.

Since the marginal effects are functions of the parameters, the standard errors of their estimates can be computed from the standard errors of the parameter estimates (taking the distribution of Z_C as given). This can in principle be done by the delta method. A computationally easier alternative is to use simulations: the standard errors in Tables 5 and 6 are computed as the standard deviations in samples of 500 marginal effects, computed from 500 draws of the vector of parameters from the estimated asymptotic distribution of the vector of parameter estimates.

Table 1a: Part-Time Work, Examination Performance, Economic Activity at 16 and Wages at 23 and 33 (in 1994 Prices)		
	Employment Status at 16:	
	Not Working (%)	Working(%)
Number of Exams Passed:		
None	51.27	53.58
1-3	19.66	23.49
4-6	13.98	13.77
7+	15.09	9.68
Activity at 16:		
School	36.84	28.66
Training	26.26	34.95
Labour Force	36.90	36.39
Wage rates 23 (£/hr)	4.42	4.73
Wage rates 33 (£/hr)	5.98	5.74
Sample Size	1531	1605

Table 1b: Examination Performance and Economic Activity at 16					
Number of O-levels passed at 16:	None	1-3	4-6	7 or more	All
Activity at 16:					
School	15.68	26.84	59.31	86.24	32.65
Training	34.22	38.79	23.68	8.99	30.71
Labour Force	50.09	34.37	17.01	4.76	36.64
Sample Size	1645	678	438	378	3136

Note: The sample size 3,136 for Tables 1a and 1b is slightly smaller than the sample used for estimation of the model. This is because here have drawn on data from the fifth sweep of NCDS in addition to information from earlier waves. Wage rates are at 1994 levels.

Table 2: Descriptive Statistics

Variable	Description	Female (n=1713) Mean	Std Dev	Male (n=1714) Mean	Std Dev
Dep. Var.:					
AT 16	Choice of activity at end of 16th year				
0	Stay at school	31.560		31.800	
1	Enroll on training scheme	22.090		38.020	
2	Enter the labour Force	46.340		30.180	
HOURS	Index of hours worked part-time at 16				
None		49.550		47.960	
0-3		2.580		6.380	
3-6		16.890		13.810	
6-9		21.620		13.600	
9-12		5.000		6.430	
12-15		1.840		5.020	
15+		2.520		6.800	
EXAM	Number of O'levels/CSE Grade 1s passed	2.207	2.89	2.433	2.91
Explanat. Var.:					
OLDSIB	Number of older siblings	0.4294	0.64	0.426	0.63
YNGSIB	Number of younger siblings	1.2118	1.23	1.195	1.25
PAAGEFT^{L*}	Age father left full-time education	4.0187	1.75	4.005	1.71
MAAGEFT^{L*}	Age mother left full-time education	4.0099	1.39	4.028	1.42
SLURATE^{E}	Regional unemployment rate for school leavers	0.0388	0.04	0.040	0.04
CTRATIO	Child-teacher ratio	17.392	14.08	17.203	1.91
ABLE7	% score on sum of age 7 maths and reading test	72.298	21.26	75.437	19.68
LOGINC^{E}	Logarithm of household income	3.864	0.37	3.858	0.42
PAWORK	Father working	0.912		0.896	
NOPA	No father	0.037		0.047	
MAWORK	Mother working	0.701		0.681	
NOMA	No mother	0.037		0.019	
PAPROF^{L}	Father's occupational class 'professional	0.055		0.059	
PASKILL^{L}	Father's occupational class 'skilled'	0.515		0.481	
PASS^{L}	Father's occupational class 'semi-skilled	0.339		0.349	
PASERV^{L}	Father's socioeconomic group 'service industry'	0.006		0.003	
PAFARM^{L}	Father's socioeconmic group 'Agricultural worker'	0.023		0.028	
MAPROF^{L}	Mother occupational class 'Professional'	0.003		0.002	
MASERV^{L}	Mother's socioeconomic group 'Service industry'	0.128		0.113	
KIDNOTEU	Teenager not European	0.014		0.009	
COMP	Teenager attends a comprehensive school (non-selective state run)	0.539		0.521	
GRAMMAR	Teenager attends a grammar school (higher ability state run)	0.133		0.165	
SPECIAL	Teenager attends a special school (handicapped and special need children)	0.023		0.017	
INDEP	Teenager attends a private school	0.048		0.040	
SINGSEX	Teenager attends a single sex school	0.249		0.284	
MODERN	Teenager attends a secondary modern school	0.243		0.248	
TECH	Teenager attends a technical school	0.011		0.005	
INTPAR	Teacher considers parents to be interested in teenager's school work	0.736		0.755	
PARLEAVE	Parents want teenager to leave at 16	0.344		0.308	
PARALEV	Parents want teenager to sit A levels	0.224		0.280	
PARUNIV	Parents want teenager to go to university	0.367		0.345	

*: These variables are measured on a scale from 1 to 10; 1 denotes that the parent left school aged 13 or less, 2 aged 13-14 etc.
^{E}: Variable excluded from examination equation. ^{L}: Variable excluded from school leaving equation.

Table 3: Hours Worked Equation

Specification	Model Ia		Model Ia	
	Males		Females	
Variable	Coeff	t-ratio	Coeff	t-ratio
Con(ho)	0.359	0.09	-1.337	-0.42
OLDSIB/10	0.006	0.01	0.235	0.78
YNGSIB/10	0.725	3.46	0.552	3.34
LOGINC	0.647	0.76	-0.245	-0.42
PAWORK	0.791	0.72	1.772	2.04
PAPROF	-0.970	-0.59	-4.207	-3.62
PASKILL	-0.393	-0.38	-1.706	-2.24
PASS	-1.162	-1.08	-1.623	-2.07
PAFARM	8.287	5.41	-0.535	-0.47
MAWORK	1.177	1.86	0.962	1.98
MAPROF	-3.881	-0.68	-4.804	-0.31
MASERV	-0.364	-0.44	0.987	1.45
PASERV	-2.127	-0.66	0.204	0.06
KIDNOTEU	-3.441	-1.51	-6.777	-2.36
COMP	-1.762	-2.79	-0.470	-0.93
GRAMMAR	-1.810	-1.74	-1.270	-1.64
INDEP	-7.409	-4.47	-2.817	-2.32
SPECIAL	-5.602	-2.64	-4.299	-2.28
SINGSEX	-1.047	-1.49	-0.119	-0.23
CTRATIO/10	-1.479	-1.12	0.572	0.46
INTPAR	0.577	1.02	1.426	2.94
PARUNIV	-3.627	-5.37	-0.263	-0.47
PARALEV	-0.889	-1.29	0.376	0.72
PAAGEFT/10	-0.553	-0.28	-1.538	-0.98
MAAGEFT/10	-1.551	-0.68	-1.826	-1.01
SLURATE	-19.245	-3.29	-24.355	-5.36
ABLE7/10	0.465	3.38	0.353	3.03
SIGMA	9.048	32.65	7.211	31.15

Note: Model Ia is the general model, allowing for correlation in the error terms, and including school type variables.

Table 4a: Exam Equation, Males						
Specification	Model Ia		Model Ib		Model IIa	
Variable	Coeff	t-ratio	Coeff	t-ratio	Coeff	t-ratio
Con(ex)	-7.326	-5.74	-7.263	-6.07	-7.231	-6.01
OLDSIB/10	-0.920	-5.52	-0.878	-5.33	-0.911	-5.22
YNGSIB/10	-0.215	-2.53	-0.208	-2.61	-0.228	-2.57
PAWORK	0.103	0.22	0.152	0.32	0.272	0.55
PAPROF	1.713	2.72	1.686	2.71	1.734	2.58
PASKILL	0.303	0.66	0.347	0.76	0.478	0.97
PASS	0.281	0.60	0.317	0.68	0.562	1.13
MAWORK	-0.311	-1.42	-0.265	-1.25	-0.342	-1.49
MAPROF	1.005	0.56	0.935	0.53	1.043	0.45
KIDNOTEU	-0.854	-0.66	-0.933	-0.74	-0.892	-0.59
COMP	0.593	2.37	0.544	2.30		
GRAMMAR	2.855	7.69	2.807	7.90		
INDEP	2.451	4.11	2.272	4.25		
SPECIAL	1.194	1.50	1.138	1.50		
SINGSEX	-0.280	-1.11	-0.293	-1.17		
CTRATIO/10	-0.458	-0.86	-0.403	-0.78	-1.379	-2.81
INTPAR	0.767	3.33	0.768	3.35	0.792	3.35
PARUNIV	3.043	10.90	2.945	12.21	3.581	11.64
PARALEV	1.257	4.83	1.207	4.73	1.548	5.67
PAAGEFT/10	1.885	2.76	1.939	2.85	2.467	3.54
MAAGEFT/10	1.777	2.17	1.738	2.13	2.231	2.59
ABLE7/10	0.670	11.94	0.684	12.89	0.825	14.78
HOURS	0.013	0.20	-0.049	-2.88	0.012	0.17
SIGMA(ex)	3.171	30.88	3.150	33.40	3.335	29.40
Rho(1,2)	-0.204	-0.94			-0.214	-0.97

Note: Model Ia is the general model, allowing for correlation in the error terms.
Model Ib ignores any correlations in the error terms.
Model IIa allows for correlation in the error terms, but excludes all the school type variables.

Table 4b: Exam Equation, Females						
Specification	Model Ia		Model Ib		Model IIa	
Variable	Coeff	t-ratio	Coeff	t-ratio	Coeff	t-ratio
Con(ex)	-10.877	-9.95	-10.881	-10.25	-8.625	-7.40
OLDSIB/10	-0.261	-1.82	-0.275	-1.94	-0.206	-1.38
YNGSIB/10	-0.161	-2.03	-0.159	-2.13	-0.190	-2.34
PAWORK	0.076	0.22	0.022	0.06	0.035	0.09
PAPROF	1.096	2.23	1.238	2.69	1.126	2.17
PASKILL	0.976	2.87	0.962	2.94	0.919	2.61
PASS	0.719	2.08	0.724	2.15	0.671	1.86
MAWORK	-0.027	-0.14	-0.019	-0.10	-0.045	-0.22
MAPROF	-0.272	-0.02	-0.389	-0.05	-0.445	-0.08
KIDNOTEU	-1.175	-1.00	-0.969	-0.83	-1.348	-1.20
COMP	0.828	3.83	0.816	3.78		
GRAMMAR	2.478	7.81	2.492	7.97		
INDEP	2.297	4.94	2.315	5.12		
SPECIAL	1.483	1.33	1.433	1.31		
SINGSEX	0.524	2.54	0.534	2.58		
CTRATIO/10	-0.150	-0.34	-0.197	-0.45	-1.841	-3.78
INTPAR	1.354	6.02	1.310	6.24	1.626	6.95
PARUNIV	2.930	12.47	2.903	12.46	3.425	14.55
PARALEV	1.129	5.12	1.127	5.13	1.380	6.05
PAAGEFT/10	1.776	2.94	1.713	2.93	2.332	3.64
MAAGEFT/10	1.444	2.05	1.544	2.21	1.551	2.11
ABLE7/10	0.945	16.56	0.943	17.31	1.099	18.67
HOURS	-0.061	-0.71	-0.022	-1.20	-0.081	-0.92
SIGMA(ex)	2.895	35.85	2.884	38.14	3.054	34.25
Rho(1,2)	0.118	0.47			0.133	0.55

Note: Model Ia is the general model, allowing for correlation in the error terms.
Model Ib ignores any correlations in the error terms.
Model IIa allows for correlation in the error terms, but excludes all the school type variables.

Table 5a: Marginal Effects, Model Ia, Males						
Decision:	Stay in School		Training		Labour Market	
Variable	Coeff	t-ratio	Coeff	t-ratio	Coeff	t-ratio
Con(le)	-0.596	3.22	0.141	0.92	0.454	2.73
OLDSIB/10	-0.019	0.82	-0.009	0.49	0.029	1.53
YNGSIB/10	-0.007	0.64	-0.003	0.31	0.010	1.19
MAWORK	-0.022	0.70	0.070	2.24	-0.047	1.70
PAWORK	0.018	0.32	-0.010	0.22	-0.007	0.17
KIDNOTEU	0.071	0.56	0.009	0.09	-0.081	0.83
COMP	0.048	1.46	-0.063	2.42	0.015	0.56
GRAMMAR	0.086	1.77	-0.272	3.81	0.186	2.49
INDEP	0.206	2.78	-0.180	1.34	-0.026	0.18
SPECIAL	0.092	0.84	-0.464	2.34	0.371	2.48
SINGSEX	0.057	1.86	0.008	0.26	-0.066	2.24
LOGINC	0.009	0.22	0.019	0.48	-0.028	0.77
SLURATE	-0.340	1.10	0.381	1.40	-0.040	0.15
CTRATIO/10	-0.138	2.53	-0.001	0.05	0.140	2.34
INTPAR	0.050	1.59	0.014	0.54	-0.065	2.54
PARUNIV	0.343	9.86	-0.151	4.16	-0.192	5.14
PARALEV	0.225	6.29	-0.085	2.41	-0.140	4.26
ABLE7/10	0.026	2.77	-0.000	0.14	-0.025	3.02
HOURS	-0.003	0.68	0.003	1.56	-0.000	0.05
EXAM	0.066	5.08	-0.006	0.68	-0.059	3.77

Note: Model Ia is the general model, allowing for correlation in the error terms.

Table 5b: Marginal Effects, Model Ia, Females						
Decision:	Stay in School		Training		Labour Market	
Variable	Coeff	t-ratio	Coeff	t-ratio	Coeff	t-ratio
Con(le)	-0.635	2.99	-0.429	2.10	1.064	4.71
OLDSIB/10	-0.033	1.69	-0.028	1.39	0.061	2.74
YNGSIB/10	0.012	0.95	-0.027	2.42	0.014	1.21
MAWORK	0.027	0.95	0.000	0.01	-0.027	0.82
PAWORK	0.024	0.50	0.027	0.56	-0.052	0.96
KIDNOTEU	-0.002	0.01	0.223	2.02	-0.221	1.26
COMP	0.062	1.88	-0.022	0.80	-0.040	1.18
GRAMMAR	0.127	2.73	-0.071	1.24	-0.055	0.82
INDEP	0.139	1.78	0.129	1.37	-0.268	2.47
SPECIAL	-0.078	0.47	0.122	1.12	-0.044	0.35
SINGSEX	0.010	0.34	-0.030	0.90	0.019	0.53
LOGINC	0.041	1.05	-0.011	0.31	-0.029	0.67
SLURATE	-0.588	1.93	-0.041	0.15	0.629	2.04
CTRATIO/10	-0.129	1.85	0.104	1.36	0.025	0.30
INTPAR	0.055	1.73	0.044	1.50	-0.099	2.77
PARUNIV	0.431	11.57	0.026	0.66	-0.457	9.96
PARALEV	0.197	5.57	0.071	2.34	-0.268	8.12
ABLE7/10	0.010	0.94	0.016	2.12	-0.026	2.37
HOURS	-0.009	1.47	0.004	1.35	0.005	0.63
EXAM	0.046	3.18	-0.001	0.11	-0.045	2.29

Note: Model Ia is the general model, allowing for correlation in the error terms.

Table 6a: Marginal Effects, Model IIa, Males						
Decision:	Stay in School		Training		Labour Market	
Variable	Coeff	t-ratio	Coeff	t-ratio	Coeff	t-ratio
Con(le)	-0.578	3.45	0.135	0.92	0.443	2.97
OLDSIB/10	-0.026	1.18	-0.004	0.19	0.030	1.86
YNGSIB/10	-0.008	0.70	-0.003	0.31	0.011	1.32
MAWORK	-0.025	0.78	0.070	2.25	-0.045	1.73
PAWORK	0.000	0.00	0.006	0.12	-0.007	0.17
KIDNOTEU	0.047	0.41	0.039	0.42	-0.087	0.93
LOGINC	0.018	0.42	0.008	0.19	-0.026	0.73
SLURATE	-0.475	1.62	0.345	1.36	0.129	0.54
CTRATIO/10	-0.134	2.80	0.003	0.17	0.130	2.38
INTPAR	0.050	1.52	0.007	0.24	-0.057	2.31
PARUNIV	0.352	9.71	-0.158	4.13	-0.194	4.98
PARALEV	0.235	6.26	-0.094	2.56	-0.140	4.30
ABLE7/10	0.030	3.40	-0.003	0.49	-0.026	3.55
HOURS	-0.005	1.16	0.005	2.68	-0.000	0.17
EXAM	0.070	5.85	-0.019	2.39	-0.051	3.82

Model IIa allows for correlation in the error terms, but excludes all the school type variables.

Table 6b: Marginal Effects, Model IIa, Females						
Decision:	Stay in School		Training		Labour Market	
Variable	Coeff	t-ratio	Coeff	t-ratio	Coeff	t-ratio
Con(le)	-0.503	2.41	-0.471	2.51	0.974	4.59
OLDSIB/10	-0.032	1.63	-0.029	1.43	0.061	2.97
YNGSIB/10	0.011	0.86	-0.027	2.42	0.016	1.39
MAWORK	0.028	0.98	-0.000	0.02	-0.027	0.83
PAWORK	0.018	0.35	0.021	0.42	-0.039	0.77
KIDNOTEU	-0.012	0.07	0.222	2.16	-0.209	1.25
LOGINC	0.043	1.07	-0.010	0.28	-0.032	0.76
SLURATE	-0.553	1.96	-0.041	0.17	0.595	2.05
CTRATIO/10	-0.201	2.99	0.128	2.03	0.072	0.93
INTPAR	0.061	1.81	0.038	1.27	-0.100	2.71
PARUNIV	0.445	11.73	0.023	0.58	-0.468	9.80
PARALEV	0.206	5.56	0.066	2.13	-0.273	7.88
ABLE7/10	0.013	1.24	0.014	1.88	-0.028	2.54
HOURS	-0.009	1.49	0.004	1.58	0.004	0.60
EXAM	0.051	3.90	-0.002	0.29	-0.048	2.73

Model IIa allows for correlation in the error terms, but excludes all the school type variables.

Table A1: Continuation Equation

Specification	Model Ia		Model IIa		Model Ia		Model IIa	
	Males				Females			
Variable	Coeff	t-ratio	Coeff	t-ratio	Coeff	t-ratio	Coeff	t-ratio
Con(le)	2.071	3.33	1.962	3.64	2.168	3.05	1.678	2.49
OLDSIB/10	0.069	0.88	0.094	1.24	0.113	1.77	0.109	1.70
YNGSIB/10	0.026	0.63	0.027	0.68	-0.042	-0.98	-0.039	-0.93
MAWORK	0.082	0.73	0.089	0.82	-0.085	-0.90	-0.090	-0.97
PAWORK	-0.058	-0.29	-0.006	-0.03	-0.082	-0.50	-0.068	-0.42
KIDNOTEU	-0.276	-0.67	-0.164	-0.41	-0.032	-0.05	0.036	0.06
COMP	-0.165	-1.44			-0.207	-1.88		
GRAMMAR	-0.293	-1.70			-0.419	-2.64		
INDEP	-0.700	-2.78			-0.455	-1.72		
SPECIAL	-0.317	-0.82			0.279	0.49		
SINGSEX	-0.202	-1.85			-0.040	-0.38		
LOGINC	-0.034	-0.24	-0.061	-0.44	-0.142	-1.10	-0.144	-1.12
SLURATE	1.180	1.09	1.594	1.52	1.949	1.97	1.817	1.89
CTRATIO/10	0.488	2.39	0.480	2.82	0.433	1.75	0.689	3.06
INTPAR	-0.178	-1.58	-0.178	-1.57	-0.184	-1.66	-0.212	-1.89
PARUNIV	-1.192	-8.67	-1.209	-8.77	-1.453	-11.16	-1.489	-11.29
PARALEV	-0.780	-5.91	-0.808	-6.21	-0.665	-5.39	-0.688	-5.61
ABLE7/10	-0.095	-2.79	-0.105	-3.30	-0.037	-1.05	-0.046	-1.30
HH3	0.011	0.76	0.018	1.24	0.033	1.54	0.033	1.53
Exam	-0.224	-5.99	-0.239	-7.01	-0.154	-3.35	-0.170	-3.99
Con(mu3)	0.526	1.46	0.461	1.39	-0.654	-0.91	-0.911	-1.34
OLDSIB/10	-0.013	-0.28	0.001	0.02	-0.052	-0.74	-0.054	-0.77
YNGSIB/10	-0.003	-0.15	-0.004	-0.19	-0.094	-2.19	-0.095	-2.24
MAWORK	0.165	2.23	0.160	2.18	-0.016	-0.17	-0.028	-0.29
PAWORK	-0.032	-0.27	0.013	0.11	0.049	0.28	0.045	0.26
KIDNOTEU	-0.024	-0.10	0.068	0.30	0.650	1.54	0.676	1.69
COMP	-0.154	-2.34			-0.128	-1.26		
GRAMMAR	-0.625	-3.87			-0.353	-1.82		
INDEP	-0.471	-1.60			0.250	0.80		
SPECIAL	-1.037	-2.31			0.460	0.99		
SINGSEX	-0.005	-0.07			-0.107	-0.92		
LOGINC	0.041	0.43	0.013	0.13	-0.072	-0.55	-0.074	-0.57
SLURATE	0.955	1.47	0.863	1.33	0.474	0.50	0.407	0.43
CTRATIO/10	0.047	0.68	0.048	1.41	0.436	1.68	0.590	2.53
INTPAR	0.013	0.19	-0.000	-0.01	0.085	0.79	0.053	0.50
PARUNIV	-0.457	-5.22	-0.447	-5.10	-0.365	-2.75	-0.383	-2.91
PARALEV	-0.275	-3.45	-0.274	-3.40	0.006	0.05	-0.007	-0.06
ABLE7/10	-0.013	-0.77	-0.016	-1.05	0.038	1.32	0.029	1.03
HH3	0.009	1.74	0.014	2.79	0.023	2.60	0.023	2.69
Exam	-0.036	-1.82	-0.060	-3.19	-0.050	-2.05	-0.057	-2.49
Rho(1,3)	0.019	0.15	-0.013	-0.11	-0.106	-0.64	-0.100	-0.61
Rho(2,3)	0.016	0.12	0.051	0.41	-0.258	-1.45	-0.238	-1.37

Note: Model Ia is the general model, allowing for correlation in the error terms.
Model IIa allows for correlation in the error terms, but excludes all the school type variables.

The second set of parameters refers to the threshold estimates (equation (4)).

Table A2: Marginal Effects, Hours and Exam, Various Specifications						
Decision:	Stay in School		Training		Labour Market	
Variable	Coeff	t-ratio	Coeff	t-ratio	Coeff	t-ratio
Model Ia, Males:						
HOURS	-0.003	0.68	0.003	1.56	-0.000	0.05
EXAM	0.066	5.08	-0.006	0.68	-0.059	3.77
Rho(1,3)	0.019	0.15				
Rho(2,3)	0.016	0.12				
Model Ib, Males:						
HOURS	-0.004	1.73	0.003	1.79	0.0005	0.28
EXAM	0.063	9.90	-0.006	0.77	-0.0574	7.27
Rho(1,3)						
Rho(2,3)						
Model Ia, Females:						
HOURS	-0.009	1.47	0.004	1.35	0.005	0.63
EXAM	0.046	3.18	-0.001	0.11	-0.045	2.29
Rho(1,3)	-0.106	-0.64				
Rho(2,3)	-0.258	-1.45				
Model Ib, Females:						
HOURS	-0.003	1.46	0.007	3.00	-0.003	1.15
EXAM	0.063	9.33	0.003	0.44	-0.066	8.09
Rho(1,3)						
Rho(2,3)						