The impact of local labour market conditions on school leaving decisions

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Abstract: We use data from the British Household Panel Survey and Labour Force Survey to examine the relationship between the demand for post compulsory education and prevailing labour market conditions in Britain. Our analysis explicitly incorporates credit constraints by allowing effects to differ between young people whose families are home owners and those whose families are not home owners. We find that youth unemployment reduces school dropout rates at age 16 among potentially constrained individuals, while adult unemployment increases their probability of leaving school. Therefore credit constrained youths, who are on average less likely to access further education, are also those more sensitive to the impact of prevailing labour market conditions on the opportunity cost of schooling and on the expected returns to education. This suggests that policies aimed at helping the economy recover from recession should further seek to increase the net gains from education for young people, particularly among those facing liquidity constraints.

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1. Introduction

It is well documented that the recent Great Recession has hit the UK labour market hard, particular among young people. For example between 2008 and 2011 the unemployment rate among 16-21 year olds rose by more than 7 percentage points, reaching 25%.[1] There is increasing discussion in policy circles about the impact that high youth unemployment rates are likely to have on young people and their future careers, with concerns about whether the early experience of unemployment will leave lasting scars in terms of future labour market attachment, wellbeing and benefit dependency. These concerns led the Government to introduce a Youth Contract to help young unemployed people get a job, launched in April 2012. This will provide nearly half-a-million new work-based opportunities for people aged 18-24, including apprenticeships and voluntary work experience placements. These are intended to help keep young workless people attached to the labour market.

What has received less attention in these discussions is the potential impact of a weak labour market on young people's educational decisions. Economic theory suggests that local labour market conditions will play a role in determining educational choices, although the direction of this effect is ambiguous. The human capital investment model, for example, predicts that education choices are made taking into account both the cost and the expected return of education (Becker 1962; 1967; Card and Lemieux 2001). Local labour market conditions affect both. On the one hand, a high level of youth unemployment reduces the opportunity costs of remaining in education, as the expected wage in employment is lower than during periods of high labour demand. This will increase participation in post-compulsory education. On the other hand, a "discouraged student" effect might prevail, whereby high adult unemployment reduces the expected returns of education and hence increasing school dropout rates. Micklewright et al. (1990), however, argues that additional schooling may protect young people from unemployment, and so high adult unemployment may encourage greater participation in education.

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[1] Source: Author's calculation based on 2008 and 2011 Quarterly Labour Force Survey (April-June quarter)

Hence economic theory suggests that labour market conditions will affect both the costs of education and the expected returns, with opposing effects on participation in post-compulsory education (Meschi et al. 2011). This raises the possibility that high rates of youth unemployment may actually have some wider long-term benefits by raising educational attainment among a cohort of school leavers who would otherwise enter a labour market during a recession. If so, the human capital stock in the economy would increase as a result of the recession, with beneficial effects both at the micro- and macroeconomic levels. However, if the discouraged student effect dominates, this would reduce human capital levels and would make economic recovery even harder.

In this paper we investigate empirically whether, and if so how, school leaving decisions of young people are influenced by local labour demand drawing on the theoretical framework provided by the human capital investment model and data from the British Household Panel Survey (BHPS) and UK Labour Force Survey (LFS). We focus on the decision to participate in post-compulsory education made at age 16, the age at which young people in Britain are first legally entitled to leave full-time education. BHPS data are used to identify school-leaving decisions among successive cohorts of 16 year olds in Britain since 1991 together with a range of individual and household characteristics (including previous educational attainment), while LFS data are used to construct measures of local labour demand.

Previous research using aggregate UK time series data typically find that the unemployment rate has a positive and statistically significant impact on enrolment in post-compulsory education over various periods between 1955 and 2005, although affects are sometimes found to be larger for men than women (Clark 2011; McVicar and Rice 2001; Pissarides 1981; Whitfield and Wilson 1991). This is consistent with the opportunity cost argument – high rates of unemployment reduce the costs of remaining in education post-16 and so increase post-compulsory enrolment. However the evidence is less clear-cut from studies using micro-data. For example, Micklewright et al. (1990) use data from the Family Expenditure Survey for the period 1978-1984 and find that the regional unemployment rate tends to reduce the demand for schooling, although this is sensitive to changes in model specification. Rice (1999) uses the Youth Cohort Studies for England and Wales and finds that the unemployment rate has a positive effect on enrolment, but only for men with low levels of educational attainment.

Petrongolo and San Segundo (2002) study the Spanish labour market and use youth unemployment rates as a proxy for the opportunity cost of enrolment in education and the general unemployment rate as an indicator of the expectation of future unemployment. The authors find a significant and positive effect of the former on the probability of remaining in education (consistent with the opportunity cost argument), while the adult unemployment rate reduces the probability (consistent with the returns to education argument). Meschi et al. (2011) estimate a nested logit model, where 16 year olds first choose between leaving education and continuing studying, and then between full-time and part-time education or between full-time employment and unemployment. Using data from a single cohort of young people in the Longitudinal Survey of Young People in England, the authors find that the local youth unemployment rate is positively related with the choice of staying in further education for men.

We add to this literature by investigating the impact of youth and adult unemployment rates on school dropout decisions at age 16 using data from successive cohorts who were aged 16 over the period 1991-2008. This allows us to identify any effects using variation in unemployment rates both across regions and over time, covering the recession of the early 1990s, the subsequent period of economic growth, and the early period of the recent Great Recession. In addition, we explicitly incorporate credit constraints by allowing effects to differ for young people whose families are home owners and those whose families are not home owners.

Credit constraints are a well known source of underinvestment in human capital: difficulties in borrowing increase the marginal cost of the investment for constrained individuals, causing them to stop schooling when the marginal return is still relatively high (Lochner and Monge-Naranjo 2011). Home ownership has been found to be an important determinant of school leaving decisions in the UK, suggesting that credit constraints may be important. For example Micklewright et al. (1990) notice that children in owner occupied households are less likely to leave school at 16, while Dearden et al. (2009) find that the introduction of the Education Maintenance Allowance had a larger and significant impact among those living in rented accommodation than home owners. Our results are consistent with this literature, in that we find that local labour market conditions are important determinants of school enrolment decisions among young people living in rented accommodation (and who we identify as being credit constrained), while they have no significant effect for those in home owning families. In

particular, estimates indicate for those in rented accommodation high youth unemployment reduces school dropout rates at age 16, consistent with lowering the opportunity cost of education, while high adult unemployment rates increase dropout rates, consistent with reducing the returns to education.

The paper is organised as follows: section 2 describes the BHPS and LFS data used in the empirical analysis and summarises the key variables of interest, section 3 introduces the estimation procedure and identification strategy; results are presented in section 4 while section 5 summarises and concludes.

2. Data and Descriptive Statistics

We use data from the British Household Panel Survey (BHPS), including the youth component, and the UK Labour Force Survey (LFS) to disentangle the relationship between local labour market conditions and participation in non-compulsory education. The BHPS is a panel survey which since 1991 has (re)interviewed the same individuals annually, with interviews generally taking place between October and December of each year. The first wave was designed as a nationally representative random sample of the population of Great Britain living in private households in 1991. These original respondents and any adult co-residents have been followed and interviewed at annual intervals ever since, with information collected about their incomes, labour market status and job characteristics (if employed), social and parental background, housing tenure and conditions, household composition, education, health and many other aspects of their lives. The BHPS is unique among British datasets in having annual snapshots of people's lives over a relatively long period. The original BHPS sample was composed of around 10,000 individuals living in 5,000 households, and this has evolved over time through the incorporation of a sub sample of the original UK European Community Household Panel (ECHP) sample from 1997-2001, of Scotland and Wales extension samples in 1999, and of a Northern Ireland sample in 2001.[2] We use these data to distinguish between school leavers and those who remain in post-

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[2] As a robustness check, we have repeated the analysis excluding these additional samples and focusing only on individuals in the core BHPS sample. The results from doing so are little different from those presented here and are available from the authors on request.

compulsory education at age 16, together with a range of other individual and household characteristics.

Since 1994, all children aged 11–15 in sample households have completed a self-completion questionnaire – known as the British Youth Panel (BYP). This collects a range of information on, for example, children's use of leisure time, their health and health-related behaviour, subjective well-being, aspirations and attitudes towards education and school, and their relationship with their families and peers. Initially, questions were recorded onto tape and children were supplied with a personal stereo and answer booklets, later replaced with laptop computers. This has two advantages: it helped to ensure that responses were confidential as other household members would not be able to interpret the answers from the answer booklets alone (the answer booklets contain only the response categories and not the questions themselves), and it also allows the child to respond to the questions at their own pace. The BYP is essentially a rotating panel, as a core group remains within the panel for a maximum of five waves while each year the 16-year olds move into the adult survey and are replaced by a new cohort of 11 year-olds. We use the BYP to measure young people's aspirations for participating in further or higher education through their responses to the question "Do you want to leave school when you are 16, or do you plan to go on to sixth form or college?", which was asked of all 11-15 year olds between wave 4 (1994) and wave 18 (2008). We use responses to this question when the young person was aged 12, chosen as a trade off between sample sizes, awareness and endogeneity. The younger the age at which we use preferences, the less likely the response is to be endogenous to subsequent educational performance and decisions. At the same time, however, the smaller the sample size for which we have data on actual school leaving decisions – as respondents need to remain in the sample for more years to have their actual behaviour observed. For example, twelve year olds will need to remain in the sample for four further years in order to observe whether or not they leave school at age 16.

These BHPS data allow us to identify 16 year olds who, when interviewed in the Autumn/Winter of a particular year, have just made the decision of whether or not to remain in post-compulsory education or whether instead to enter the labour market or become economically inactive. Given that the majority of interviews take place between September and December each year, and always before May of the subsequent year, we can identify young people who have just made

this choice using their month and year of birth.[3] We identify those who remain in post-compulsory schooling as those who were aged 16 in August of that year and who remain in full-time education at the date of interview. Those who were aged 16 in August of that year and are not in full-time education are defined as school leavers.

Our focus is on the impact of labour market conditions on the school leaving decision. We capture the labour market conditions using regional unemployment rates derived from the UK Labour Force Survey (LFS). The LFS is a nationally representative household survey which collects data on a range of individual and household characteristics, focussing in particular on employment status, education, and job characteristics. It has been collected quarterly since 1992. We use these data to construct gender-specific ILO unemployment rates among 16-21 year olds and 40-64 year olds in each metropolitan region of the UK in the Spring quarter of each year.[4] We match these to the BHPS data by gender, region and year of interview. We use data for the Spring of each year for two reasons. Firstly this is likely to be the period of the year when pupils make the decisions about their educational choices for the next academic year. Secondly, in the Spring quarter the respondents are still in full time education and therefore the youth unemployment rate used in the analysis is not being affected by the choices made by the relevant cohort.

Figure 1 plots the school leaving rates for each year of the BHPS, defined as those who were eligible to leave school in the preceding June and who were not enrolled in full time education at the time of the BHPS survey. This highlights a clear downward trend since 1999, from a drop-out rate of 35% in 1999 to about 20% since 2006, consistent with the increase in post-compulsory education in Britain. However the drop-out rate is much less stable in earlier years, varying from 40% in 1991 to below 20% in 1995. This fluctuation between 1991 and 1999 is likely to be caused by both the emergence from the recession of the early 1990s, and also to relatively small sample sizes in years prior to 1999. For example, wave specific sample sizes between 1991 and 1998 vary between 140 observations in 1995 and 176 observations in 1997,

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[3] In Britain, children must remain in full-time education up to the last Friday in June in the academic year of their 16th birthday. Therefore BHPS respondents in wave 1, who were interviewed during the 1991/1992 academic school year, would have been making the school-leaving decision in June 1991 if born between September 1974 and August 1975. Those born before September 1974 would have already been aged 16 in June 1990 and so would have made the decision in the previous year, while those born after August 1975 would be making the decision in June 1992.

[4] The exception is for 1991, when the data were collected on an annual basis rather than quarterly.

while from 1999 onwards they vary from 254 observations in 1999 to 332 observations in 2001. This increase in largely due to the introduction of the Scotland and Wales extension samples in wave 1999.

In Table 1 we provide some descriptive statistics for the variables used in the analysis, both for the sample of interest and separately by whether or not the respondent was a school leaver or stayed in full-time education. The final column contains the p-value of the t-test for equality of the means between those observed to leave education and dropout and those staying in further full time education. Consistently with previous literature on the intergenerational transmission of cognitive abilities, there is a high correlation between parental education and young people's decision to participate in post-compulsory education (Anger and Heineck 2010; Black et al. 2009; Bjorklund et al. 2009). Among those observed to stay in further education, 47% have low educated parents (defined as both parents having compulsory schooling only), 21% have medium educated parents (having at least one parent educated to A-Level standard or the equivalent) and 30 % have high educated parents (at least one parent educated to above A-Level standard). The remaining 2% do not live with parents. Among those observed to leave school, the respective percentages are 66%, 17% and 10% (the remaining 7% do not live with their parents). Previous research has indicated that parental education is highly correlated with children's educational attitudes and aspirations (Rampino and Taylor 2012). The differences between the parental education of those observed to drop out and those observed to stay in further education are highly significant.

Furthermore we find that young people who drop out of school at age 16 are significantly more likely than those who remain in full-time education to have an unemployed parent (7.5% compared with 4.8%), and also to be in a lower household income decile. The average school leaver is between the 5th and 6th household income decile, while on average those that remain in education lie between the 6th and 7th decile. Large differences also emerge in the proportions who are not home owners – 41% of young people who drop out of education at age 16 do not live in home-owning households compared with 22% of those who remain in full-time education. Families with lower incomes will be less able to invest optimal amounts into their children's education or may be prevented from providing their children with an appropriate learning environment (Carneiro and Heckman 2002; Mayer 1997). Furthermore parental income has been

shown to have significant impacts on educational attainment and explain the persistence of disadvantage across generations (Shavit and Blossfeld 1993), while parental wealth and socioeconomic status is inversely correlated with children's educational aspirations and expectations (Chowdry et al. 2011; Ermisch et al. 2001; Gregg and Washbrook 2011; Rampino and Taylor 2012).

Significant differences also emerge between stayers and leavers in the proportions who live outside the parental home. Not surprising, a significantly smaller proportion of young people who remain in full-time education than those who leave have left the parental home (1.5% compared with 7.2%). We also find very large and statistically significant differences between leavers and stayers in the number of GCSEs obtained at grades A^*-C. Young people who remain in full-time education on average have 5 GCSE passes at these grades, while those dropping out have less than 2 on average. Of course, this strong relationship is at least partly endogenous, as young people who have already decided to leave full-time education have little incentive to do well in GCSE exams. This is highlighted by young people's preferences for leaving school at age 16, measured when they were aged 12. This reveals that 30% of leavers reported at age 12 wanting to leave school at age 16, compared with just 8% of stayers (although note the much reduced sample sizes for this variable). We return to issues relating to potential endogeneity of variables of interest in the subsequent section.

It is reported in the related literature that girls exhibit more positive educational aspirations and attitudes than boys (Rampino and Taylor 2012; Schoon et al. 2007; Willitts et al 2005), and consequently will have higher staying-on rates. This is reflected in our data, with 57% of school leavers at age 16 being boys, compared with 46% of those who remain in full-time education. Finally, both youth (16-21 year olds) and adult (40-64 year olds) unemployment rates are positively correlated with leaving school at age 16. The average youth unemployment rate faced by school leavers is 15.8%, compared with 15.3% for those remaining in post-compulsory education, while the adult unemployment rates are 4.4% and 4.0% respectively. Differences between leavers and stayers are statistically significant, and this is preliminary evidence suggesting that young people are more likely to leave school at age 16 during periods of low labour demand. This supports the hypothesis that young people perceive the expected returns to

education to be lower when unemployment rates are higher. In the subsequent sections, we test this more robustly using multivariate analysis.

3. Estimation Strategy and model specification

The aim of this research is to identify how local labour market conditions affect the demand for post compulsory schooling, explicitly controlling for the presence of liquidity constraints. The dependent variable in our analysis is dichotomous, taking the value of one if the youth leaves full-time education at the age of 16, and zero if (s)he remains in education. As described in the data section, this is identified soon after the end of the final year of compulsory schooling. We therefore estimate a series of binary dependent variable models of the following form:

$$pr(D_i = 1 \big| x, U) = pr(\alpha_1 + \alpha_2 x_i + \alpha_3 U_i + \varepsilon_i > 0) \tag{1}$$

where $D_i = 1$ if the young person i left school at age 16, and $= 0$ if (s)he remained in full-time education, x_i is a vector of individual and household characteristics, U_i captures local labour market conditions, and the α are vectors of coefficients to be estimated. We assume that the error term ε_i is logistically distributed, and so estimate equation (1) using logistic regression.

The key explanatory variables of interest are captured by U_i. We use quarter, gender and regional-specific unemployment rates to capture business cycle effects and the strength of the local labour market. We distinguish between youth unemployment rates (unemployment among 16-21 year olds) and adult unemployment rates (40-64 year olds). The former captures the immediate prospects of the young person gaining employment if exiting school at age 16, and the expectation is that high levels of current youth unemployment reduces the opportunity cost of remaining in education as it reduces the probability of finding a job. Hence we expect this to have a negative impact on the probability of leaving education at age 16. We use the year, gender and regional-specific adult unemployment rate to capture the expected future returns to education, as it measures the probability of future unemployment. It is more difficult to a priori predict the direction of the impact of adult unemployment. As reported by Micklewright et al (1990), it is possible that a higher adult unemployment rate affects both those who remain in education and those who chose to leave education in the same way – that is reducing the returns to education and so increasing the probability of leaving education at age 16. However, it is also

possible that more educated people may be less affected by the expectation of future unemployment, in which case the returns to education will remain positive even in the face of high unemployment, and so high adult unemployment will reduce the school dropout rate.

However the impact of local labour market conditions on the post-compulsory schooling decision may be sensitive to the presence of credit constraints. Such constraints are a known cause of underinvestment in human capital, and a credit constrained individual might therefore be more sensitive to variations in both the opportunity costs of and returns to education than an credit unconstrained individual. Intuitively, in order to invest in non-compulsory education, we would expect credit constrained individuals to require the opportunity costs of education to be lower and the returns to education to be higher than non-credit constrained individuals. To investigate whether this is the case, we interact the two measures of unemployment with home ownership (which is our measure of credit constraints).

We include a range of other individual and household and individual level characteristics into the models. These include parental education, current parental unemployment, household income and home ownership, which are known to be strongly correlated to schooling choices (Micklewright 1989; Micklewright et al. 1990; Petrongolo and San Segundo 2002; Pissarides 1981). It is well documented that differences in educational choices and performance by socioeconomic background reflect different opportunities and environments, with differing access to learning resources, role models, occupational knowledge and informal networks (Keller and Zavalloni 1965; Schoon 2006; Vondracek et al. 1986). Other control variables include gender, whether or not the respondent has moved away from the parental home, and the number of siblings.

We also include previous educational attainment, via the number of GCSEs obtained with grades A*-C, as well as preferences for leaving school at age 16 reported when the child was aged 12. The former has been shown to play a key role in determining participation in non-compulsory education choices (Meschi et al. 2011; Rice 1999). It measures academic ability, and the opportunity costs of remaining in post-compulsory education will be lower for more able students. The latter captures preferences, and clear positive correlations have emerged in the literature between educational attitudes, aspirations and expectations of children and their

subsequent attainment and education-related behaviour (Andrews and Bradley 1997; Chowdry et al. 2011; Duncan et al. 1972; Khoo and Ainley 2005; Sewell et al. 1980; Strand 2007).

These variables may, however, suffer from endogeneity. The unemployment rate is likely to affect both effort expended in preparing for GCSEs as well as the school leaving decision, which would make this a 'bad control' (Angrist and Pischke 2008). We deal with this in two ways. Firstly we present estimates from models of the impact of unemployment rates on the school leaving decision that both include and exclude the number of GCSEs grades A^*-C obtained. Secondly we estimate models that allow GCSE performance and the school leaving decision to be jointly determined. We do this using seemingly unrelated regression, where we specify:

$$D_i = \beta_1 + \beta_2 y_i + \beta_3 U_i + u_i \tag{2}$$

$$G_i = \gamma_1 + \gamma_2 y_i + \gamma_3 U_i + \delta_i \tag{3}$$

where (2) is estimated using a linear probability model and (3) using ordinary least squares regression, and we allow for correlation between u_i and δ_i. This approach is more efficient in that standard errors are corrected for the correlation between the residuals.

Preferences for leaving school at age 16 which are reported at age 12 may suffer from a similar problem. It is possible, if unlikely, that at age 12 children already have an expectation of the unemployment rate they will face at age 16, and that their preferences for leaving school at age 16 are reported accordingly. It is also possible that preferences at age 12 reflect the same credit constraints that were faced at age 16. In both cases school leaving preferences reported at age 12 represent an outcome of other explanatory variables as well as a determinant of the observed school leaving decision. To identify any biases the inclusion of these variables cause, we present estimates from models that both include and exclude school leaving preferences reported at age 12.

4. Estimates

Table 2 reports the estimated coefficients from logistic regressions where the dependent variable takes the value 1 if the young person left education at age 16 and 0 if (s)he remained in full-time education at the end of compulsory schooling. We estimate five different specifications. Model

(1) includes unemployment rates and home ownership among the regressors, but it excludes interactions between the two. Previous educational attainment (number of GCSEs) and preferences for school leaving at 16 reported at age 12 are also excluded, on the grounds that they are bad controls. Model (2) is the base model, which includes the interactions between unemployment rates and housing tenure and excludes previous educational attainment and preferences reported at age 12. Model (3) adds educational attainment to the specification, Model (4) adds preferences reported at age 12, while Model (5) adds both. Note that sample sizes are considerably lower in Models (4) and (5) because these require respondents to have been interviewed at both age 12 and age 16.

The coefficients reported in Model (1) of table 2 show that the youth unemployment rate has a negative and statistically significant impact on the school leaving decision. Marginal effects, reported in table 3, show that a one percentage point increase in the youth unemployment rate is associated with a reduction in the dropout probability of 0.4 percentage points. This is consistent with theoretical predictions and with previous empirical findings (see, for example, Petrongolo and San Segundo 2002 and Meschi et al. 2011). The coefficient on the adult unemployment rate is negative but not significant. Youths living in families that do not own their own home are significantly more likely to drop out. The difference in the predicted probability of leaving school at age 16 between young people living in rented and owned accommodation is close to 11 percentage points. The sign of this effect is consistent with the socioeconomic gradient commonly found in studies of educational outcomes (e.g. Micklewright et al. 1990).

Model (2) further analyses the relationship between the youth unemployment rate, credit constraints and the school leaving decision by introducing interaction terms between non home ownership condition and unemployment rates. We find that neither the youth unemployment rate nor the adult unemployment rate have a statistically significant impact on the school leaving decision. The estimated coefficients are negative, but are not significantly different from zero. Similarly to in Model (1), young people in rented accommodation have a higher probability than those living in home-owning families of leaving school at age 16 – the estimated coefficient is positive and statistically significant from zero. Furthermore, we find that the prevailing unemployment rates have a statistically significant impact on school leaving decisions for young people living in rented accommodation, and who are potentially credit constrained. In particular

we find that a higher prevailing youth unemployment rate reduces the probability of leaving education at age 16, while a higher adult unemployment rate increases the probability. The estimated marginal effects (presented in Table 4) shows that a one percentage point increase in the youth unemployment rate reduces the probability of leaving school by 1.3 percentage points for young people in rented accommodation. A one percentage point increase in the adult rate increases the probability of leaving school at 16 by 1.8 percentage points. For both measures of unemployment rate, a test rejects the null hypothesis of equality of the marginal effects of home owners and non home owners. These estimates are consistent with the predictions from economic theory that people who are credit constrained under-invest in education (those in rented accommodation are more likely than those from home owning families to leave school at age 16), but they are also more sensitive than those not facing credit constraints to labour market incentives. Our estimates are consistent with the idea that credit constrained individuals choose to invest in post-compulsory education only if prevailing labour market conditions indicate that the net gains from education, that is the difference between the expected returns and the opportunity cost, are sufficiently large.

The estimates on the other controls are consistent with previous research. We find, for example, that young men are more likely to leave school at age 16 than young women (see also, for example, Petrongolo and San Segundo 2002). We also find strong associations between parental education and leaving school at age 16. In particular children of highly educated parents are least likely to leave school at 16, while those of parents with few educational qualifications are most likely (see also Meschi et al. 2011; Micklewright et al. 1990). This is consistent with much previous research suggesting that children from with more highly educated parents have differing access to learning resources, role models, occupational knowledge and informal networks than those with less educated parents (Keller and Zavalloni 1965; Schoon 2006; Vondracek et al. 1986). No significant relation emerges between household income and dropout choices. Finally we find that the number of siblings has no impact on educational choices at age 16.

Model (3) in Table 2 includes the number of GCSEs obtained with grades A^*-C among the regressors, to capture the academic ability of the child at the risk of including a bad control. The coefficient on this is large, negative and highly statistically significant, indicating that young

people who attain more good GCSE passes (and hence are more able) have a lower probability of leaving education at age 16. This is likely to be a biased estimate, given that those who have already decided to leave school at 16 are likely to exert less effort into their GCSE performance. The addition of this control affects the size and significance of the estimated coefficients on the non home-owner indicator and its interaction with the youth unemployment rate. In particular, we find that the estimated coefficient on the dummy for not being a house owner becomes smaller and it loses statistical significance. This indicates that GCSE performance is highly correlated with housing tenure, and again this is consistent with credit constrained individuals (non home-owners) under-investing in education resulting in attaining fewer good GCSE passes. The coefficient of the interaction between youth unemployment rate and not owning the home becomes smaller and loses statistical significance, although remains negative. However the interaction between the adult unemployment rate and not owning the home remains positive and statistically significant, indicating that credit constrained individuals are more likely to leave school at 16 when the expected future returns to the investment are lower. The sizes of these effects, shown by the marginal effects in Table 5, are similar to those to the previous model.

Model (4) instead adds preferences for leaving school at age 16 recorded when the child was aged 12. The estimated coefficient on this is, as expected, large, positive and statistically significant, indicating that young people who previously expressed a preference for leaving school at 16 are most likely to subsequently do so. This is consistent with an extensive previous literature highlighting the associated between preferences, attitudes and aspirations and subsequent outcomes (Andrews and Bradley 1997; Chowdry et al. 2011; Duncan et al. 1972; Khoo and Ainley 2005; Sewell et al. 1980; Strand 2007). The inclusion of this variable also reduces the size and statistical significance of the estimated coefficient on the rented accommodation indicator, such that it loses statistically significance. This is consistent with research indicating a socio-economic gradient in educational preferences and aspirations ((Chowdry et al. 2011; Goodman and Gregg 2010; Gregg and Washbrook 2011; Schoon and Parsons 2002; Rampino and Taylor 2012; Willitts et al. 2005). However including this variable has little impact on the size and significance of the estimated coefficients on the interactions between non home ownership and the unemployment rates (see, for example, the marginal effects presented in Table 6).

Finally, Model (5) in Table 2 presents estimates when including both prior educational attainment and school leaving preferences reported at age 12. The key things to note from this specification are that, even when controlling for these additional variables (and with the much reduced sample size) the estimated coefficient on the interaction between the adult unemployment rate and not owning the home remains positive, large and statistically significant from zero. Hence we find that among credit constrained young people, educational choices at age 16 are sensitive to the expected future returns to their investment in education. In particular, credit constrained young people are less likely to invest in post-compulsory education when the expected future returns from this investment are lower.

Our findings indicate that prevailing labour market conditions do have relatively large and statistically significant impacts on the decision to enrol in post-compulsory education in Britain. However this only emerges for the credit constrained – those who live in families that do not own their own home. For this group, a one percentage point increase in the youth unemployment rate is predicted to reduce the probability of leaving school at age 16 by between 1.1 and 1.8 percentage points, while an increase of one percentage point in the adult unemployment rate is predicted to increase the probability by between 2 and 4.2 percentage points.

5. Conclusions

In this paper we have examined the relationship between the demand for post compulsory education and prevailing labour market conditions in Britain. This follows approaches adopted by Petrongolo and San Segundo (2002), among others, and identifies the extent to which youth and adult unemployment rates affect school leaving decisions at age 16, while explicitly taking into account the presence of credit constraints which affect individual choices. Our estimates indicate that young people who do not face credit constraints are not affected by local labour demand, while those who are credit constrained instead are affected. In particular, for this group an increase of one percentage point in the youth unemployment rate is associated with a reduction in the probability of leaving school at age 16 of between 1.1 and 1.8 percentage points, while an increase in the adult unemployment rate is associated with an increase in the probability of between 2 and 4.2 percentage points. These results are consistent with predictions from the human capital investment model (Becker 1967; Card and Lemieux 2001; Micklewright et al. 1990), and confirm the propensity of credit constrained individuals to under-invest in education.

The recent Great Recession has had a considerable affect on labour markets, and unemployment rates among young people in particular have increased significantly. Unemployment rates among 16 to 21 year olds has increased by 7.5 percentage points between 2008 and 2011, reaching levels exceeding 25%, while that among people aged 40-64 has increased from 3.2% to 5% over the same period. Given this, and given our estimate of how these increases with affect school leaving decisions, we can extrapolate the extent to which these increases in unemployment are likely to have affected school leaving rates. According to our estimates, the increase in 7.5 percentage points in the youth unemployment rate will, all else equal, have reduced the probability of credit constrained young people leaving school at age 16 by between 8.3 and 13.5 percentage points. This is due to the lower opportunity cost associated with remaining in education during periods of high unemployment. The 1.8 percentage point increase in the adult unemployment rate will, all else equal, have increased the propensity of credit constrained young people to leave school by between 3.6 percentage points and 7.6 percentage points, due to the lower expected returns to investing in education. Hence the net effect of these changes in labour demand will be to reduce the probability of credit constrained young people leaving school at age 16 by between 0.7 and 10 percentage points.

In this sense, therefore, it could be argued that the Great Recession has potentially had a beneficial effect through increasing participation in post-compulsory education among the credit constrained. However this has to be considered in the wider political and economic climate, which in 2012 is quite different from that prevailing over the period for which these data relate. It is difficult to know the extent to which our estimates would change if more recent data on school leaving decisions and labour demand were used. Our estimates show that young people who are on average less likely to access further and higher education are also those more sensitive to prevailing labour market conditions and to their impacts on the opportunity cost of schooling and the expected returns to education. This suggests that policies aimed at helping the economy recover from recession should further seek to increase the net gains from education for young people, and for those facing liquidity constraints in particular. The introduction of higher student tuition fees are unlikely to help in this regard. Furthermore, to ensure that levels of skills and human capital in society continue to increase, policy makers need to ensure that as the economy recovers, labour demand strengthens and unemployment rates fall (particularly among

young people), pursuing post-compulsory education remains an attractive prospect as the opportunity costs of staying in school fall.

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Tables and Figures

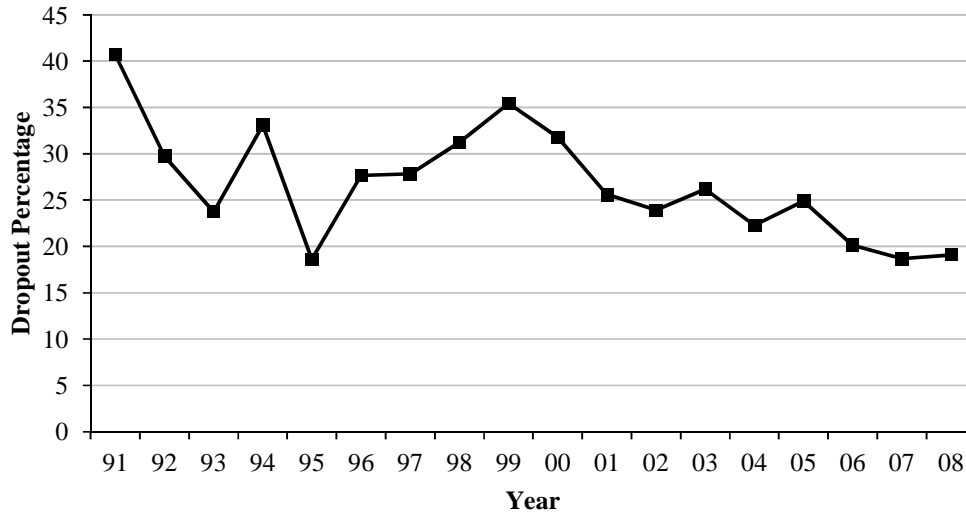**Figure 1: Dropout rate over time: BHPS 1991-2008**

Table 1: Descriptive Statistics

	N	Mean	Stayers Mean	Leavers Mean	p-value (stayers=leavers)
Parental education:					
Low	3957	0.516	0.466	0.657	0.000
Medium	3957	0.204	0.215	0.171	0.002
High	3957	0.249	0.303	0.097	0.000
Has unemployed parent	4065	0.055	0.048	0.075	0.003
Household income decile	3986	6.055	6.302	5.357	0.000
Non-home owner	3998	0.271	0.221	0.414	0.000
Number of Siblings	4065	1.288	1.293	1.274	0.638
Lives alone	4065	0.030	0.015	0.072	0.000
Number of GCSEs grade A-C	3918	4.172	5.082	1.558	0.000
Male	4065	0.486	0.457	0.567	0.000
Wanted to leave school at age 16	1415	0.122	0.076	0.301	0.000
Unemployment rate 16-21 yr-olds	4065	15.417	15.297	15.756	0.014
Unemployment rate 40-64 yr-olds	4065	4.110	4.008	4.398	0.000

Notes: BHPS 1991-2008. Respondents eligible to leave school in June preceding each date of interview. Low educated parents refers to both parents having compulsory schooling only, medium education refers to at least one parent having A-Levels or the equivalent, high education refers to at least one parent having qualifications above A-Level standard.

Table 2: Determinants of leaving school at age 16

	(1)	(2)	(3)	(4)	(5)
Youth unemployment rate	-0.0285**	-0.0121	-0.0252	-0.0251	-0.0436
	(-2.22)	(-0.84)	(-1.54)	(-0.98)	(-1.52)
Adult unemployment rate	-0.0100	-0.0634	-0.0279	-0.113	-0.0927
	(-0.28)	(-1.60)	(-0.65)	(-1.10)	(-0.87)
Non home-owner	0.617***	0.731***	0.240	0.428	-0.114
	(6.44)	(2.74)	(0.82)	(0.75)	(-0.19)
Non home-owner					
*Youth unemployment rate		-0.0482**	-0.0300	-0.0814**	-0.0522
		(-2.41)	(-1.39)	(-2.01)	(-1.22)
*Adult unemployment rate		0.151***	0.131***	0.370***	0.316**
		(3.37)	(2.74)	(2.59)	(2.23)
Number of GCSEs grade A*-C			-0.249***		-0.222***
			(-16.65)		(-8.64)
Reported wanting to leave school at 12				1.435***	1.050***
				(7.26)	(4.93)
Male	0.694***	0.686***	0.509***	0.717***	0.551***
	(5.96)	(5.89)	(4.01)	(3.78)	(2.72)
Lives alone	1.203***	1.187***	0.993***	1.573***	1.364**
	(5.61)	(5.54)	(4.35)	(2.98)	(2.35)
Mid educated parent	-0.386***	-0.395***	-0.203*	-0.414**	-0.184
	(-3.71)	(-3.80)	(-1.83)	(-2.14)	(-0.91)
Highly-educated parent	-1.221***	-1.234***	-0.876***	-1.038***	-0.728***
	(-9.56)	(-9.66)	(-6.52)	(-4.70)	(-3.11)
Number of siblings	-0.00237	-0.00252	-0.0487	-0.0433	-0.0872
	(-0.06)	(-0.07)	(-1.20)	(-0.56)	(-1.06)
Constant	-1.102*	-1.210**	-0.359	-0.568	1.022
	(-1.93)	(-2.06)	(-0.54)	(-0.48)	(0.79)
N	3908	3908	3810	1359	1339

All estimations include wave and regional dummies Income decile and dummy for having at least one parent unemployed included in the regressions but not reported.
t statistics in parentheses. $^{*} p < 0.10$, $^{**} p < 0.05$, $^{***} p < 0.01$

Table 3: Average Marginal Effect after model 1

	Marginal Effect	se	pvalue
Youth unemployment rate	-0.0047796	0.0021508	0.026
Adult unemployment rate	-0.0016786	0.0059432	0.778

Table 4: Average Marginal Effect after model 2

	Marginal Effect	se	pvalue
Youth unemployment rate			
Home owner	-0.0018213	0.0021737	0.402
Non Home-Owner	-0.0127231	0.0039575	0.001
Diff	-0.0109018	0.0038815	0.005
Adult unemployment rate			
Home owner	-0.0095578	0.0060030	0.111
Non Home-Owner	0.0184500	0.0094078	0.050
Diff	0.0280078	0.0085551	0.001

Table 5: Average Marginal Effect after model 3

	Marginal Effect	se	pvalue
Youth unemployment rate			
Home owner	-0.0033754	0.0021954	0.124
Non Home-Owner	-0.0107188	0.0038541	0.005
Diff	-0.0073434	0.0037867	0.052
Adult unemployment rate			
Home owner	-0.0037276	0.0057530	0.517
Non Home-Owner	0.0199763	0.0092662	0.031
Diff	0.0237038	0.0083295	0.004

Table 6: Average Marginal Effect after model 4

	Marginal Effect	se	pvalue
Youth unemployment rate			
Home owner	-0.0031553	0.0032207	0.327
Non Home-Owner	-0.0175913	0.0062445	0.005
Diff	-0.0144360	0.0062213	0.020
Adult unemployment rate			
Home owner	-0.0141878	0.0128929	0.271
Non Home-Owner	0.0423956	0.0204920	0.039
Diff	0.0565834	0.0210402	0.007

Table 7: Average Marginal Effect after model 5

	Marginal Effect	se	pvalue
Youth unemployment rate			
Home owner	-0.0049707	0.0032823	0.130
Non Home-Owner	-0.0152419	0.0062198	0.014
Diff	-0.0102713	0.0061918	0.097
Adult unemployment rate			
Home owner	-0.0105595	0.0121771	0.386
Non Home-Owner	0.0354890	0.0187212	0.058
Diff	0.0460485	0.0194705	0.018