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The impact of local labour market conditions on school leaving decisions

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Non-Technical Summary

Using data from the British Household Panel Survey and Labour Force Survey, this paper analyses the role of prevailing labour market conditions in affecting the demand for post compulsory education in Britain and it investigates to what extent this relationship varies across socio-economic groups.

Labour market conditions affect schooling decisions in potentially contrasting ways. On the one hand, an increase in youth unemployment is predicted to increase the demand for education. This is because the alternative to school leaving, i.e. looking for a job, becomes less attractive. On the other hand, assuming that changes in the adult unemployment rate influence the longer term employment expectations of young people, two scenarios are possible. First, a higher level of adult unemployment can encourage schooling if education is perceived to significantly improve employment chances in a context of higher unemployment. Second, students can also be discouraged by increases in adult unemployment, in which case pursuing further education will lose its appealing.

A large body of evidence has shown a strong positive association between family resources and children's educational outcomes, either due to richer families not suffering from credit constraints or because they are more likely to raise their children in an environment favourable to education.

Our results show that family resources influence school leaving decision mainly through past investment in the child's schooling ability. We also find that local labour market conditions matter, but only for young people from disadvantaged socio economic groups. In particular, we show that the school enrolment of young people from economically disadvantaged families increases in periods of higher youth unemployment while it is discouraged by high levels of adult unemployment. The schooling demand of young people from better off families is not responsive to changes in the local labour market conditions. We argue that factors associated with family resources, such as parental tastes for education or social norms, make young people from better-off families prefer to study even when it becomes less beneficial from an economic point of view. On the other hand, young people from economically worse-off families tend to enrol in post compulsory education when the expected net gains are sufficiently high. As labour market conditions improve after the Great Recession, our results highlight the importance of post-compulsory education being perceived as an economically attractive option, particularly among young people from lower socio economic backgrounds.

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Abstract: We use data from the British Household Panel Survey and Labour Force Survey to analyse the relationship between the demand for post compulsory education and prevailing labour market conditions in Britain. We explicitly incorporate the role of family resources by allowing effects to differ between young people whose families are home owners and those whose families are tenants. We find evidence that local labour markets significantly influence school leaving decisions of 16 year olds living in tenant households, specifically in social housing. For these groups, an increase in the local youth unemployment rates positively affects school enrolment – consistent with opportunity cost arguments – while high levels of adult unemployment discourage it. Labour markets do not significantly affect school leaving decisions of students from better off families. Our results suggest that factors associated with the family socio economic status, such us parental tastes for education and social norms, outweigh economic considerations among students from higher socio economic backgrounds, who tend to enrol in higher education irrespectively of labour markets conditions.

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I. Introduction[1]

It is well documented that the recent Great Recession has had considerable impacts on the UK labour market, in 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%.[2] There is increasing discussion in policy circles about the impact that high youth unemployment rates 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 provides nearly 500,000 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 effect of labour market conditions on school leaving decisions. According to the prediction of the human capital investment model (Becker 1962; Card and Lemieux 2001), education decisions respond to changes in labour market conditions as these affect both the opportunity cost and the expected returns of schooling. However, it is not possible to determine a priori whether a worsening in labour market conditions increases or reduces the demand for schooling. As well as reducing the opportunity cost of education, a worsening of labour market conditions can either encourage schooling if this is perceived as a way to avoid future unemployment or discourage it otherwise (e.g. Meschi et al. 2011; Petrongolo and San Segundo 2002; Micklewright et al. 1990; Kodde 1988). Changes in labour market conditions can hence affect demand for schooling in potentially contrasting ways, and the net effect cannot be determined a priori.

Focusing on the choice of staying at school at age 16, i.e. after completion of compulsory education, in this paper we investigate empirically (i) how local labour market conditions influence secondary schooling decisions of young people in the UK and (ii) to which extent the responsiveness of the demand for post-compulsory education to labour market conditions varies across students from different economic background.

[1] The contents of the literature review, data and methods sections already appeared in part in the working paper Tumino (2013), and some sections of text are directly reproduced.
[2] Source: 2008 and 2011 Quarterly Labour Force Survey (April-June quarter)

Previous studies have shown mixed evidence on the relationship between labour market conditions and demand for schooling (Meschi et al. 2011; Petrongolo and San Segundo 2002). Strong evidence exists in support of family economic circumstances playing a major role in affecting children educational achievements, either through (the lack of) credit constraints and/or because of unobserved characteristics that are associated with higher family resources - e.g. access to better schools, school friendly family environment, parental tastes for education (Lochner and Monge-Naranjo 2011; Carneiro and Heckman 2002). Despite that, our knowledge about a socio-economic gradient in responses to incentives from the labour market is limited and particularly relevant in the current economic climate. Changes in labour market conditions during the Great Recession might in fact not only have affected the demand for schooling in the society, but also be associated with a widening or a shrinking in the socio-economic gap in educational achievement.

Following Petrongolo and San Segundo (2002) and analysing data from the British Household Panel Survey (BHPS) and Labour Force Survey (LFS), we use the local youth unemployment rate as a proxy for the opportunity cost of education and the adult unemployment rates to proxy future employment expectations (and hence return to education). Our preferred measure of family economic background is home ownership, as the home is usually the most valuable asset held by a family and assets capture better than income the longer term family socio economic status (Nam and Huang 2009). In a different model specification, we also enrich our housing tenure definition by differentiating between home owners, private renters and social renters. Finally, as a robustness check, we analyse to which extent the response of the demand for post compulsory education to changes in labour market conditions varies across quintiles of equivalised household income.

Consistently across model specifications, our results show that young people from economically worse-off families respond to increases in local youth unemployment rates by increasing demand for schooling, while they respond to increases in adult unemployment rates by reducing the probability of enrolling in post compulsory education. The results are consistent with theoretical predictions by Kodde (1988). The response to labour market conditions by young people from well-off families is not statistically significant.

Although disentangling the role of credit constrains as opposed to other longer term factors associated with family resources goes beyond the scope of this analysis, our evidence suggests for the latter to be the most plausible explanation of the different responses to labour market incentives between young people from different socio-economic backgrounds. In particular, our results suggest that young people from worse-off families tend to assign more importance to economic consideration when choosing whether to enrol in post-compulsory education. Conversely, young people from better-off families tend to enrol irrespective of labour market conditions, arguably because of stronger family tastes for education which justify schooling even when economic considerations make it less convenient.

The paper is organised as follow: section II introduces our theoretical framework and contains a review of the literature; section III describes the BHPS and LFS data used in the empirical analysis and summarises the key variables of interest; section IV introduces the estimation procedure and identification strategy; results are presented in section V while section VI concludes.

II. Theoretical framework and literature review

This section is organised as follow. Sub-section III.1 introduces the theoretical framework that we use to analyse the relationship between labour market conditions and school leaving decisions and discusses the relevant literature. In sub-section III.2 we summarise the previous findings on the relationship between family resources and schooling decisions. Sub-section III.3 discusses the extent to which family resources can affect the response to labour market conditions and its implications for our work.

II.1 Labour markets and demand for schooling

Economic theory suggests that an increase in the unemployment rate faced by youth reduces the opportunity cost of schooling as intuitively it makes more difficult to find a job in the event of leaving school (Meschi et al. 2011; Petrongolo and San Segundo 2002; Micklewright et al. 1990). We hence expect a positive relationship between youth unemployment rates and demand for schooling.

Under the assumption that adult unemployment rates influence future employment expectations, variations in adult unemployment rates are also expected to affect educational decisions. Kodde

(1988) analyses two possible scenarios. On the one hand, an increase in adult unemployment might cause a downward shift in the relationship between future employment prospects and schooling. Intuitively, this happens if employment expectation declines constantly across levels of education. Such a shift would discourage investment in education. However, it is also possible for an increase in unemployment to reduce employment expectations more at the bottom of the education distribution than at the top. In this case education could be seen as an enhancing factor for future employability, with a consequent positive effect on the demand for schooling (Meschi et al. 2011; Petrongolo and San Segundo 2002; Micklewright et al. 1990). Whether the first effect, which we term the "discouraged student effect", or the second, that for simplicity we call the "insurance effect", prevails is an empirical question which we address by exploiting data from the British Household Panel Survey (BHPS) and Labour Force Survey (LFS).

Previous research on the influence of labour market conditions on the demand for schooling has found mixed evidence. Using time series data covering various periods between 1955 and 2005, a number of studies have shown that unemployment rates affect the demand for post compulsory education in the UK, although effects are sometimes found to be larger for males. In particular, Pissarides (1981) and Whitfield and Wilson (1991) report a positive association between adult unemployment rates and the demand for post compulsory education, while McVicar and Rice (2001) and Clark (2011) find that the youth unemployment rate significantly increases schooling demand. Among microdata based studies, Meschi et al. (2011) show that the demand for post compulsory education is positively associated with local youth unemployment rates and Rice (1999) show that the demand for schooling increases with local unemployment rates primarily for males with low levels of previous education attainment. By contrast, Micklewright et al. (1990) find that school leaving rates tend to increase with regional unemployment rates, although this finding is not robust to changes in the model specification. Analysing the relationship between labour market conditions and demand for post compulsory education in Spain, Petrongolo and San Segundo (2002) use the local youth unemployment rate as a proxy of the opportunity cost of schooling and the general local unemployment rate as an indicator of weak future employment prospects. Consistent with theoretical prediction, the authors show that the demand for schooling reacts positively to increases in the local youth unemployment rates and negatively to changes in adult unemployment.

In this paper, we follow the methodology proposed by Petrongolo and San Segundo (2002) and analyse to which extent the demand for post-compulsory education responds to variations in the opportunity cost of schooling (measured by changes in youth unemployment rates) and to changes in the return to schooling (measured by adult unemployment rates). We add to previous studies by explicitly modelling the role of family resources, and in particular home ownership, in determining how young people respond to labour market incentives.

II.2 Family resources and schooling

Previous research has shown that family resources greatly affect children's educational outcomes (see among others Cameron and Heckman 2001; Carneiro and Heckman 2002, Blanden and Gregg 2004, Huang et al. 2010). This relationship is usually explained by the presence of short term borrowing constraints and/or of a strong association between family resources and longer run factors which are also likely to boost children's academic ability and school outcomes.

In the presence of credit market imperfections, the borrowing constraints hypothesis predicts that young people from low income families might face higher costs in accessing the resources needed to participate in post-compulsory education. The marginal cost of schooling would hence be higher for young people from constrained families, causing them to invest sub-optimally in education (Lochner and Monge-Naranjo 2011). The second hypothesis suggests that the positive relationship between family income and school attainment might be the consequence of long run factors associated with family resources. This theory suggests that family income is highly correlated over a child's life cycle and that families with more resources during a child's formative years are able to "better shape the abilities and expectations of their children, who are better able to perform at school" (Carneiro and Heckman 2002). Hence higher family income is associated with higher ability and expectations among children, raising their educational attainment. Examples of long term factors associated with family income include the quality of primary and secondary school attended or parental tastes for education which are then passed to their children (Carneiro and Heckman 2002). Although a number of papers have found evidence consistent with the presence of credit constraints in the US (e.g. Kane 1996, Belley and Lochner 2007), several studies have failed in identifying in the presence of borrowing constraints a quantitatively relevant limitation for schooling progression in the US (e.g. Carneiro and Heckman 2002, Cameron and Taber 2004, Keane and Wolpin 1997, Huang et al. 2010).

In addition to parental income, several studies suggest that parental assets are important in explaining educational outcomes. Nam and Huang (2009) suggest that assets are a good indicator of the household liquidity level since savings reduce the need for borrowing while tangible assets facilitate the access to credit by providing collaterals; moreover, the authors report that assets may be a better measure than income for socio-economic inequality and a more suitable indicator of the long term economic status of the family. As with the family income hypothesis, assets might affect schooling achievement through both a short term borrowing constraint and a long term family background perspective (Huang et al. 2010).

The home is typically the most valuable and also the most commonly held asset. Lovenheim (2011) studied the effect of housing wealth on college enrolment in the U.S. and reports that, between 1977 and 2005, 85% of college attendees came from families that own a home and finds a positive effect of housing wealth on college enrolment (see also Dietz and Haurin 2003). Beyond financial reasons and consistent with Carneiro and Heckman's (2002) thesis on the association between family income and educational outcome, Green and White (1997) suggest several other paths through which home ownership might influence children's educational outcomes. They suggest that owning a house may improve management skills which can be transferred to the children. They also argue that home owners might monitor more their own children and those of their neighbours to prevent the values of their properties to be reduced by children misconduct. However, it is also possible that children of homeowners outperform children of non-homeowners not because the parents are homeowners, but because their parents possess some unobservable attributes which make them more likely both to become homeowners and to raise successful students.

A large literature has analysed the extent to which household resources influence educational attainment in the UK. Blanden and Greg (2004) find evidence of a positive relationship between household income and post compulsory education enrolment, and similar findings can be found in Rice (1987) and Chevalier et al. (2005) among others. Using cohort survey data for 1970 and 1958 cohorts, Machin and Vignoles (2004) find evidence on the relationship between family income, parental social class and higher education achievement becoming stronger over time. Studying enrolment at higher education institutions, Chowdry et al. (2013) provide evidence in favour of an association between family socioeconomic status (SES) and educational outcomes

too. However, the authors show that the impact of SES is greatly reduced when controlling for secondary school achievement. The result suggest hence that parental SES is particularly important at earlier stage rather than on university entry.

Home ownership has also been found to be an important determinant of school leaving decisions in the UK. Micklewright et al. (1990), for instance, show that children in owner occupied households are less likely to leave school at age 16, while Dearden et al. (2009) find that the introduction of the Education Maintenance Allowance had a significant impact mainly among those living in rented accommodation, suggesting that credit constraints may be important.

II.3 Family resources and responses to labour market conditions

A small number of articles have analysed to which extent incentives from labour markets are heterogeneous across population groups. Among them, Smith and Naylor (2001) find that the probability of dropping out from university is positively affected by the general unemployment rate in the country of origin and that the response is significantly bigger for male students from lower social class. In their analysis of post compulsory education choices in Spain, Casquel and Uriel (2009) find that family income positively affects the probability of staying in post compulsory education, while general unemployment reduce it. The authors also show that this response is statistically significant for young people from lower income families.

In this paper we investigate to what extent young people from different socio-economic background respond differently to changes in labour market conditions. Our results show that only young people from an economically disadvantaged background respond to changes in labour market conditions, while we do not find evidence of responses from young people from economically better-off families. In particular, consistent with the opportunity cost argument, we show that among young people from home renting families, and in particular social tenants, an increase in youth unemployment rate is associated with an increase in the demand for schooling. We also find evidence that the same young people are discouraged by increases in adult unemployment rates.

Differences in unobserved factors associated with family resources are likely to be the main reason of such different behaviours. On the one hand, young people from richer/wealthier families can be less sensitive to variations in incentives from the labour markets if factors

associated with family socio-economic status, such us parental tastes for education, outweigh economic considerations in their schooling decisions (e.g. students from better off-families will study even if it is perceived as less profitable from an economic point of view). On the other hand, youth from worse off families might tend to assign more weight to economic considerations, responding more to changes in labour market conditions.[3] Misinformation and unawareness about the real costs and benefits of education are possible causes of such differences (see Oreopoulos and Dunn 2013 and papers therein cited).

What about credit constrains? Cameron and Taber (2004) develops a theoretical model which allows to predict how young people from better-off and worse-off families would react to changes in opportunity cost and direct cost of education if differences in family resources were only capturing a lack of borrowing constraints. In particular, the model predicts that responses to changes in the opportunity cost will be the same across constrained and unconstrained individuals, while young people from constrained family will respond more to changes in direct cost associated with education (see also Lochner and Monge-Naranjo 2011). The model does not allow to predict a priori whether young people from borrowing constrained families would respond more or less to changes in expected return to schooling.[4]

Since our results show no significant response from youth from better off families to changes in youth unemployment rates, while opportunity cost arguments significantly apply to youth from worse off families, we can infer that unobserved factors associated with family resources drive the different response to changes in labour market conditions across the two groups. However, we leave to future research further investigations on the role played by borrowing constraints as opposed to factors associated with family resources, as this lies outside the scope of this paper.

Another point needs to be clarified. Assuming that both young people from better-off and worse-off families respond to changes in labour market conditions, we expect for changes in the opportunity cost of schooling to increase the demand for schooling. But why should an increase

[3] The finding is consistent with the sociological literature summarized in Brand and Xie (2010). The authors report that social norms make college enrolment a "socially expected outcome" for individual from higher socio economic group, while economics consideration play a more important role for youths from worse off groups.

[4] The model predicts that both constrained and unconstrained individuals will respond to changes in the return to schooling, but there is uncertainty on which group experience the strongest response. For given values of the parameter measuring the utility curvature, and for a sufficiently low direct cost of education, it can be shown that response from unconstrained youth is smaller than the response from constrained youth. The opposite is otherwise true.

in adult unemployment rate discourage post compulsory school enrolment among the less advantaged students? In the framework first proposed by Kodde (1988), increases in future unemployment expectations can enhance or discourage investments in education depending on whether more schooling is expected to enhance employability. Irrespectively of whether borrowing constraints or factors associated with family resources drives differences in demand for schooling, on average students from worse-off families will arguably expect to reach a lower level of education than students from richer families. Under the assumption that the enhancing effect of extra education on future employability increases with the years or quality of extra education (i.e. the difference in employment probability between studying for 11 against 10 years is smaller than the one expected between 15 and 10 years) we can expect the "discouraged student effect" to prevail among students from worse off economic backgrounds, while the opposite could be true for students from a richer background.

The next section introduces the data and the variables used for the empirical analysis.

III. Data and Descriptive Statistics

We use data from the British Household Panel Survey (BHPS) 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 launched in 1991 which surveyed people annually for 18 waves until 2008. Originally designed as a nationally representative random sample of the population of Great Britain living in private households, the original BHPS sample evolved overtime 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 from 1999, and of a Northern Ireland sample in 2001. All household members aged 16 and over were usually (re)interviewed between September and December of each year, with information collected about their incomes, education, social and parental backgrounds, labour market status, job characteristics, housing tenure and other aspects of their life (Taylor et al. 2010). Together with a range of other individual and household characteristics, these 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. 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. [5]

Our focus is on the impact of labour market conditions on the school leaving decision. We capture labour market conditions using regional unemployment rates derived from the UK Labour Force Survey (LFS). The LFS is a nationally representative survey of households living at private addresses in the UK and collects data on a wide range of individual and household characteristics, with a particular focus on employment status, job characteristics and education. Conducted for the first time in 1973, the survey was carried out every two years until 1983, annually between 1984 and 1991 and quarterly since 1992.[6] 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.[7] 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. Second, in the spring quarter the respondents are still in full time education and therefore the youth unemployment rate used in the analysis is not affected by the choices made by the relevant cohort.

Figure 1 plots the school leaving rates for each year of the BHPS together with the average prevailing youth and adult unemployed rates. The school leaving rate is defined as the number of young people eligible to leave school in the preceding June and who were not enrolled in full time education at the time of the BHPS survey over those who were eligible to leave school. This highlights a clear downward trend since 1999, from a school leaving rate of 35% in 1999 to about 20% since 2006, consistent with the increase in participation in post-compulsory education in Britain. However the school leaving rate is much less stable in earlier years, varying from 40%

[5] We identify young people who have just made the choice using their month and year of birth. 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.

[6] See ONS (2007) for more information.

[7] Second quarter (Apr-June) since 2006, when calendar quarter replaced seasonal quarter. The exception is for 1991, when the data were collected on an annual basis rather than quarterly. The choice of using 16-21 is the consequence of a tradeoff between the strength of the "peer effect", i.e. it would be better to use a more strict definition of youth unemployment rate, number of observations in the LFS and correlation with adult unemployment rate.

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 when Scotland and Wales extension samples were introduced.

The trend in the average regional and gender specific 16-21 unemployment rate is decreasing between 1993 and 2004, and increasing after that. A negative relationship seems to emerge when compared with the school living rate: when youth unemployment increases the school leaving rate seems to decrease, and vice versa. If confirmed, this would be consistent with youth unemployment reducing the opportunity cost of education. The average regional and gender specific 40-64 unemployment rate faced by young people choosing whether to participate in further education shows a declining trend between 1993 and 2004 while it is stable until the end of the analysed period.

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 means between those observed to leave education (leavers) and those staying in further full time education (stayers). This shows that both youth and adult 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.

Large differences between the two groups emerge in the proportions of young people living in renting households - 41% of those who drop out of education at age 16 are in renting households compared with 22% of those who remain in full-time education. This distinction is most apparent among social tenants – 35% of school leavers are social tenants compared with 17% of stayers. Young people who drop out of school at age 16 are also significantly more likely to be in lower income households. For example, the proportion of school leavers in the lowest quintile is 33%, while for stayers it is 22%. The opposite happens for the richest quintile: 14% of the stayers come from families who are in the top 20% of the income distribution, while this applies to only 5% of the school leavers.[8] Families with higher incomes are more able to invest optimal amounts

[8] Household Income is equivalised using the modified OECD scale, which assign a weight of 1 to the household head, 0.5 to other adults and 0.3 to each child under the age of 14

into the education of their children or might provide them with a more appropriate learning environment (Carneiro and Heckman 2002; Mayer 1997). Moreover, previous studies show that parental income significantly affects educational attainment and explains the intergenerational transmission of disadvantage (Shavit and Blossfeld 1993), while parental wealth and socioeconomic status is positively associated with higher educational aspirations and expectations among children (Chowdry et al. 2011; Ermisch et al. 2001; Gregg and Washbrook 2011).

Consistent with previous literature on the intergenerational transmission of cognitive abilities, there is a high correlation between parental education and young people's decisions 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 the proportion of people with parents with ISCED level smaller than 2 (Lower secondary or less) is significantly higher among leavers (67%) than among stayers (42%); on the other hand, the proportion of stayers with maximum parental education higher than ISCED level 5a (Degree or more) is 19%, a level significantly higher than the 5% for school leavers.

According to previous studies, girls exhibit more positive educational aspirations and attitudes than boys (Taylor and Rampino 2014; Rampino and Taylor 2013), 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. 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%).

We also find very large and statistically significant differences between leavers and stayers in the number of GCSEs obtained with grades A*-C or Scottish Standard Grade (STGR) obtained with grades 1 or 2 (Meschi et al. 2011; Rice 1999). For example, the proportion of people with no good passes in such examinations is 54% among school leavers and 19% among stayers. 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 their exams. In the remainder of the paper we examine these relationships within a multivariate framework.

IV. 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 role of family resources, and home ownership in particular. 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:

$$pr(D_i = 1 | x, R, U) = pr(\alpha_1 + \alpha_2 x_i + \alpha_3 U_i + \alpha_4 R_i + \alpha_5 R_i \times U_i + \varepsilon_i > 0) \quad (1)$$

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 a logistic regression, although we also present estimates from a linear probability model for our preferred models specification.

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 expectation of future employability. It is more difficult to predict the direction of the impact of adult unemployment. As reported by Kodde (1988) and Micklewright et al. (1990) among others, it is not possible to determine a priori the direction of the impact of adult unemployment. It is possible that a higher adult unemployment rate discourages investment in further education if the extra education is not expected to improve future employability, but it also possible for education to be seen as a way

to escape future unemployment. In the former case, the return to education would be negatively affected by adult unemployment while in the latter case it would be positively affected.

R_i measures family resources. In our base specification this is measured by the housing tenure of the family. If on the one hand home owners could be less affected by borrowing constraints, living in a home owning family is also associated with factors like higher permanent income, better home learning environment, better schooling, and higher family educational expectations (Carneiro and Heckman, 2002). In our base specification, we test the extent to which home ownership influences the way labour market incentives affect educational decisions by interacting the two measures of unemployment with housing tenure. We anticipate home ownership playing a key role in the school leaving decision, either due to credit constraints or other unobservable factors associated with parental assets and educational decisions.

In a second model specification, we further distinguish between people living in privately rented accommodation and those in social housing given that private renters are likely to be different from social renters. We also check the robustness of our finding to the use equivalised household income quintiles as the measure of family resources interacted with unemployment rates. Despite being more volatile than housing tenure and worse at capturing longer term socio-economic status of the family (Nam and Huang 2009) family income is the most widely used measure of family resources. Moreover, it is possible that some homeowner families could actually be credit constrained if they are paying for a mortgage, while family income does not suffer from this problem.

We include a range of other individual and household level characteristics into the models. These include parental education, current parental unemployment and household income, which are known to be strongly correlated to schooling choices (Micklewright 1989; Micklewright et al. 1990; Petrongolo and San Segundo 2002; Blanden and Gregg 2004). Other control variables include gender, whether or not the respondent has moved away from the parental home, and other indicators of family composition such as whether the respondent has younger or older siblings.

We also include previous educational attainment, via the number of GCSEs obtained with grades A*-C or Scottish Standard Grades obtained with grade 1 or 2. As well as capturing academic

ability, these are likely to be strongly correlated with family resources. In particular, existing evidence on the relationship between family resources and educational outcomes shows that better off families are able to raise more academically able children because they are able to invest more in education throughout the child's life (i.e. Cameron and Heckman 2001; Carneiro and Heckman 2002). Also, educational attainment has been shown to play a key role in determining participation in non-compulsory education (Meschi et al. 2011; Rice 1999), and evidence exists in the literature of a positive correlation between children's educational attitudes, aspirations and expectations and their subsequent education-related attainments and behaviour (Andrews and Bradley 1997; Chowdry et al. 2011; Duncan et al. 1972; Khoo and Ainley 2005; Sewell et al. 1980; Strand 2007).

Regional and year dummies are also included in the regressions to capture the effects that are fixed across years for a given region or across regions for a given year. All standard errors are clustered at the regional level.

V. Estimates

In this section we present and discuss estimates from our models. First we focus on differences between young people living in home-owning families and those living in renting families. We then further distinguish between social tenants and private renters as the latter are likely to be a very heterogeneous group, while those in social housing are likely to face the greatest borrowing constraints and have the fewest family resources.

V.1 Home ownership

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 four different specifications. Model (1) includes unemployment rates and home ownership among the regressors, but it excludes interactions between the two. Model (2) augment model (1) by including measures of previous education attainment of the child. As this is likely to be influenced by longer term family resources, by controlling for previous educational attainment we control whether housing tenure continues to play a role in educational choices (Cameron and Heckman 2001). In model (3) we include interactions between unemployment rates and housing tenure, allowing for different

responses to changes in unemployment rates between home owners and renters. Model (4) contains the same specification as model (3), but estimated by a linear probability model.

The coefficients reported in column (1) of table 2 show that both youth unemployment and adult unemployment rates have negative but not statistically significant impact on the school leaving decision at age 16. Consistent with previous studies (e.g. Micklewright et al. 1990) we find that young people living in families that do not own their home are significantly more likely to leave school. Children from higher income families are also less likely to leave school at age 16 (e.g. Blanden and Gregg 2004). The estimates on the other controls are also consistent with previous research. We find, for example, that young men are more likely to leave school at age 16 than young women (Petrongolo and San Segundo 2002). We also find strong negative associations between parental education and the probability of leaving school at age 16, with children from less educated parents more likely to dropout than those from highly educated parents (see also Micklewright 1989).

Average marginal effects from model (1) are reported in the first panel of table 3, and show that the effect on youth unemployment is negative and at the margin of statistical significance, with a 1 percentage point increase in youth unemployment rate reducing school dropout by 0.4 percentage points. Although weekly significant, the result is consistent with youth unemployment capturing the opportunity cost of schooling. The marginal effect on adult unemployment is also negative, but it is not statistically different from zero. Finally, consistent with Micklewright et al. (1990) among others, young people from home-renting families are 9 percentage points more likely to leave school at age 16 than young people from home-owning families.

Model (2) introduces a control for previous education attainment measured as the number of good passes in GCSE or Scottish Standard Grade exams. Analysing the estimated coefficients reported in column (2) of table 2 it emerges that school leaving probabilities are significantly correlated with previous education attainment, with the most successful students significantly more likely to enrol in further education than less successful ones (Meschi et al. 2011; Rice 1999). Moreover, compared with estimates relative to model (1), it should be noted that the coefficient on housing tenure decreases in size and becomes statistical significant only at the 10% level, while the coefficients on household income quintile lose their statistical significance.

Marginal effects reported in panel 2 of Table 3 confirm the negative, although weekly significant effect of youth unemployment rate on school leaving probabilities, with a one percentage point increase in youth unemployment leading to a 0.4 percentage points reduction in the probability of leaving school at age 16. Average marginal effects also show that those with 1 to 4 good passes in GCSE or Scottish Standard Grade are 11.6 percentage points less likely to leave school at age 16 than those with no passes. For those with 5 to 9 good passes the probability of leaving school at 16 is 30 percentage points lower, while those with 10 or more have a probability of leaving school that is 39 percentage points lower than those with no passes. More importantly for our analysis, the average marginal effect on renting falls from 9 percentage points in model (2) to 4 percentage points, and remains significant only at the 10% level. This suggests that long term family resources more than short term credit constraints explain differences in educational investment between home owners and renters (Carneiro and Heckman 2002).

Model (3), which represents our base specification, includes interaction terms between housing tenure and the unemployment rates. The estimates indicate that neither the youth unemployment rate nor the adult unemployment rate have a statistically significant impact on the school leaving decision when not interacted with housing tenure. The coefficient on renting, as well as those on household income, is not statistically different from zero. The coefficients on our measure of previous education attainment are large, negative and highly statistically significant, indicating that young people who attain more good GCSE/Scottish Standard Grade passes (and hence are more able) have a lower probability of leaving education at age 16. Furthermore, we find that the prevailing unemployment rates have a statistically significant impact on school leaving decisions for young people living in rented accommodation. 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.

Marginal effects after model (3) are reported in panel 3 of table 3, and are in line with previous specification. Panel 1 of table 4 reports the marginal effects for the unemployment rates by housing tenure. These are computed by averaging the marginal effects on youth and adult unemployment rates among homeowners and renters separately. Results show that a one percentage point higher youth unemployment rate lowers the probability of leaving school by 1 percentage point for young people in rented accommodation. This is consistent with the youth

unemployment rate capturing the opportunity cost of education, and hence young people in rented accommodation remaining in education when the opportunity cost of doing so is low. A one percentage point higher adult unemployment rate raises the probability of leaving school at 16 for young people in rented accommodation by 2.3 percentage points. Thus for those in rented accommodation, higher levels of adult unemployment reduce the expected returns of education, discouraging investments in schooling. The demand for schooling of young people from home owning families does not respond to changes in labour market conditions and for both unemployment rates, the null hypothesis of equality of the marginal effects for home owners and renters is rejected. Model (4) estimates specification (3) using a linear probability model. The estimated coefficients and the reported marginal effects are highly consistent to those from our base specification and confirm our findings.

As a further check, we also compute the marginal effects of youth and adult unemployment at the median of all the dependent variables, assuming students to belong to home-owning families first and renting families later. Results are reported in table 5 and are highly consistent with those reported in table 4.

Consistent with previous studies, our results show that young people from renter families invest less in education than home owners although long term family resources, through their effect on children's academic ability, explain most of the differences in school leaving decisions between the two groups. Our findings also 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 young people living 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 1 percentage point, while an increase of one percentage point in the adult unemployment rate is predicted to increase the probability by 2.3 percentage points. Young people from renting families hence invest more in post-compulsory education if the prevailing labour market conditions indicate that the net gains from education (the difference between the expected returns and the opportunity cost) are sufficiently large. On the other hand, young people from home owning families are not responsive to changes in labour market conditions. Differences in factors associated with family resources such us parental tastes for education or social norms are a possible explanation for this

different behaviour. If young people from better off families might choose to study irrespective of labour market conditions, young people from worse off families tend to do so when it is economically beneficial.

In the next sub-section we further investigate the role of housing tenure in affecting the response to local labour market conditions by distinguishing between young people living in home-owning families, those in social housing and private renters. Private renters are in fact likely to be a very heterogeneous group, while young people from households who live in social housing are both more likely to be credit constrained and to have a permanently lower level of family resources.

V.2 Social Housing

Models (5) to (8) extend the models presented in the previous subsection by differentiating between home owning, private renting and social tenants households. The estimated logit coefficients from this set of models are reported in Table 6, with average marginal effects in Table 7 and the marginal effects on unemployment rates for those living in social housing, private tenants and home-owners reported in Table 8.

The models estimated follow those presented in Table 2. Model (5) includes housing tenure and unemployment rates, but excludes their interaction, and the estimated coefficients show that young people from private renting families and those in social housing are more likely than those in home owning families to leave school at age 16. The estimated coefficients on the youth and adult unemployment rates are negative and not statistically significant. Consistent with the opportunity cost argument and with findings from model (2), average marginal effects show that an increase in youth unemployment has a negative and weakly significant negative effect on school leaving probabilities. The average marginal effect on adult unemployment is negative but not statistically significant, while both young people from private and social renting family are significantly more likely to leave school at age 16 than home owners.

Consistent with findings from model (3), the introduction in model (6) of previous academic achievements as a control captures most of the effect of housing tenure, which becomes non statistical significant.

Model (7) introduces the interaction between unemployment rates and housing tenure. They indicate that only young people from social housing respond to labour markets. In particular, and consistent with what we found for all renters in section V.1, a higher youth unemployment rate is associated with a lower probability of leaving school at age 16 for young people in social housing, while a higher adult unemployment rate is associated with a higher probability of dropping out. These results confirm the propensity of the most disadvantaged group, those living in social housing, to respond to incentives from the labour market.

A comparison of the marginal effects of the youth and adult unemployment rates between young people from different housing tenures are reported in Table 8. These show that only those from social housing significantly respond to the youth unemployment rate, with a 1 percentage point higher unemployment rate leading to a lower probability of leaving school at age 16 by 1.1 percentage points. A test of the equality of the estimated marginal effects rejects the null hypothesis of equality between those living in social housing and home owners, while the null hypothesis of equality cannot be rejected when comparing the impact of youth unemployment of social tenants with private renters. Young people from families in social housing are also the only group to respond to changes in adult unemployment, with an estimated marginal effect of 3.1 percentage points for a 1 percentage point higher adult unemployment rate. A test of the equality of marginal effects between those in social housing and both home owners and private renters is rejected at the 1% and 5% level respectively. This suggests a different response between the most disadvantaged group, i.e. those living in social housing, and the rest of the population.

Similar to the previous section, in table 9 we also report marginal effects on youth and adult unemployment rates at the median of all the dependent variables, assuming students to belong to the three housing tenure categories in turn. Results are highly consistent with those reported in table 8.

From this we conclude that renters are a highly heterogeneous group. Among them, social tenants are both more likely to leave school at age 16, although this is largely explained by a child's academic ability, and are most responsive to labour market incentives.

V.3 Robustness checks

We conduct a number of robustness checks. First, we tests to which extent responses to labour market conditions vary across quintiles of the income distribution. Despite housing tenure being more likely than income to capture factors associated with the longer term socioeconomic status of the family, income is the most widely used measure of family resources and it does not suffer from the problem that some home owners, who are expected to be less credit constrained than non-home owners, might be in fact constrained if still paying for a mortgage.

We modify our model by replacing the interaction terms between housing tenure and unemployment rates in models (3) and (4) with interaction terms between unemployment rates and equivalised household income quintiles (M9 and M10-LPM). Estimated coefficients after the logit specification are reported in columns (1) of table A1, while estimates from the linear probability model are reported in column (2). In both cases the coefficients on the non-interacted unemployment rates, which capture the response to local market conditions for the poorest quintile of the income distribution, are statistically significant. The sign is negative for youth unemployment rate, which is consistent with the opportunity cost argument, while the sign on the coefficient on adult unemployment is positive, which within our theoretical framework indicates that young people from lowest quintiles of the income distribution tend to be discouraged by increases in unemployment expectations. The interaction terms between unemployment rates and household income quintiles are statistically significant too, at least for students from families belonging to the third quintiles or above, and they tend to counterbalance the effect on the non-interacted unemployment rates (i.e. they are positive for interaction with youth unemployment rates and negative for interactions with adult unemployment rates).

Average marginal effects are reported in table A2, and are in line with those reported in table 3. Table A3 reports the average marginal effects on youth and adult unemployment rates by quintile of household equivalised income. Consistent with the findings of previous sections, these results confirm that young people from lowest quintile of the income distribution react to an increase in youth unemployment rates by increasing demand for schooling, while they react to an increase in adult unemployment rates by reducing it.

Second, thus far we have captured previous educational attainment by the number of good passes at GCSE level. However, this might be endogenous as the timing of the exams almost overlaps with decision of staying in further education. Consequently pupils may choose the effort to put into studying for the exams depending on their perceived probability of accessing further education. Ideally, this endogeneity problem would be solved using a different measure of ability, with respect to the timing of the assessment (e.g. at age 11) and/or its nature (e.g. cognitive abilities measured in a context unrelated with school performance). Although neither of these are available in our data, we examine the robustness of our estimates by using another source of information that is likely to capture the effect of long term family resources on a child's academic ability. Specifically we use the preferences of the child towards further education revealed at age 12.

All young people aged 11-15 living in sampled households completed a self-completion questionnaire since 1994 known as the British Youth Panel (BYP). Similar to Taylor and Rampino (2014), 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 less likely respondents are to be aware of the importance of future educational choices and 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, and we have matched expectation/actual choice data only from 1998 onwards (e.g. when the 12 years old in 1994 decided whether to participate or not in further education).

We hence modify our preferred model specification (3) by replacing our measure of previous academic achievement with education expectation measured at age 16 (M11). Model estimates are reported in the first column of table A4, average marginal by housing tenure in table A5.

Estimates show that education expectations are strongly correlated with the school leaving probability, with those expecting to leave school at age 16 more likely to actually leave it. This is consistent with an extensive previous literature highlighting the association 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). Despite a reduction in the significance level of our estimates caused by the loss in sample size due to not having data for waves 1-7, results confirm our main findings that an increase in youth unemployment rate is associated with an increase in the demand for schooling among young people from renting families, who are also discouraged by increases in adult unemployment rates.

Third, we re-estimate our baseline model specification excluding the boost samples and only focusing on the original Essex Sample (M12). Estimates and marginal effects are reported in panel 2 of tables A4-A5 and are consistent with our main findings, although the average marginal effect on youth unemployment rate among non-home owners becomes slightly smaller and at the margin of statistical significance. The drop in estimation sample, which loses on third of the total number of observations, is likely to explain this.

VI. 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. It explicitly models the role of homeownership, a highly valuable and commonly held asset, in determining how young people respond to incentives from labour markets. Our estimates indicate that local labour market conditions matter, but only for young people from families living in rented accommodation, and in social housing in particular. For young people in rented accommodation, a one percentage point higher youth unemployment rate is associated with a one percentage point lower probability of leaving school at age 16, while a one percentage point higher adult unemployment rate raises the probability of leaving school at age 16 by 2.3 percentage points. These effects are concentrated among those in social housing.

These findings are consistent with predictions from the human capital investment model (Becker 1967; Card and Lemieux 2001) and can be explained with stronger preferences toward education among students from well-off families who, for factors such as different parental tastes for education or social norms, prefer to study even when it becomes less profitable from an economic point of view. On the other hand, young people from economically worse-off families take local labour market conditions into account when deciding whether or not to enrol in further education, and do it when the expected net gains are sufficiently high.

The recent Great Recession has had a considerable effect 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 among people aged 40-64 unemployment has increased from 3.2% to 5% over the same period. Given this, and given our estimate of how these increases will 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 young people in social housing leaving school at age 16 by 8.2 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 their propensity to leave school by 5.6 percentage points, due to the lower expected returns to investing in education. Hence the net effect of these changes in the unemployment rates could be to reduce the probability of young people from social tenant families leaving school at age 16.

Therefore, it could be argued that the Great Recession has potentially had a beneficial effect on the stock of human capital through increasing participation in post-compulsory education among the most disadvantaged group. However this has to be considered in the wider political and economic climate, which at the time of writing is quite different from that prevailing over the period for which these data relate.

We find 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 their impacts on the opportunity cost and the expected returns to schooling. This suggests that policies aimed at

helping the economy recover from the recession should further seek to increase the expected net gains from education for young people, and from lower socio-economic groups in particular. 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.

Tables and Figures

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

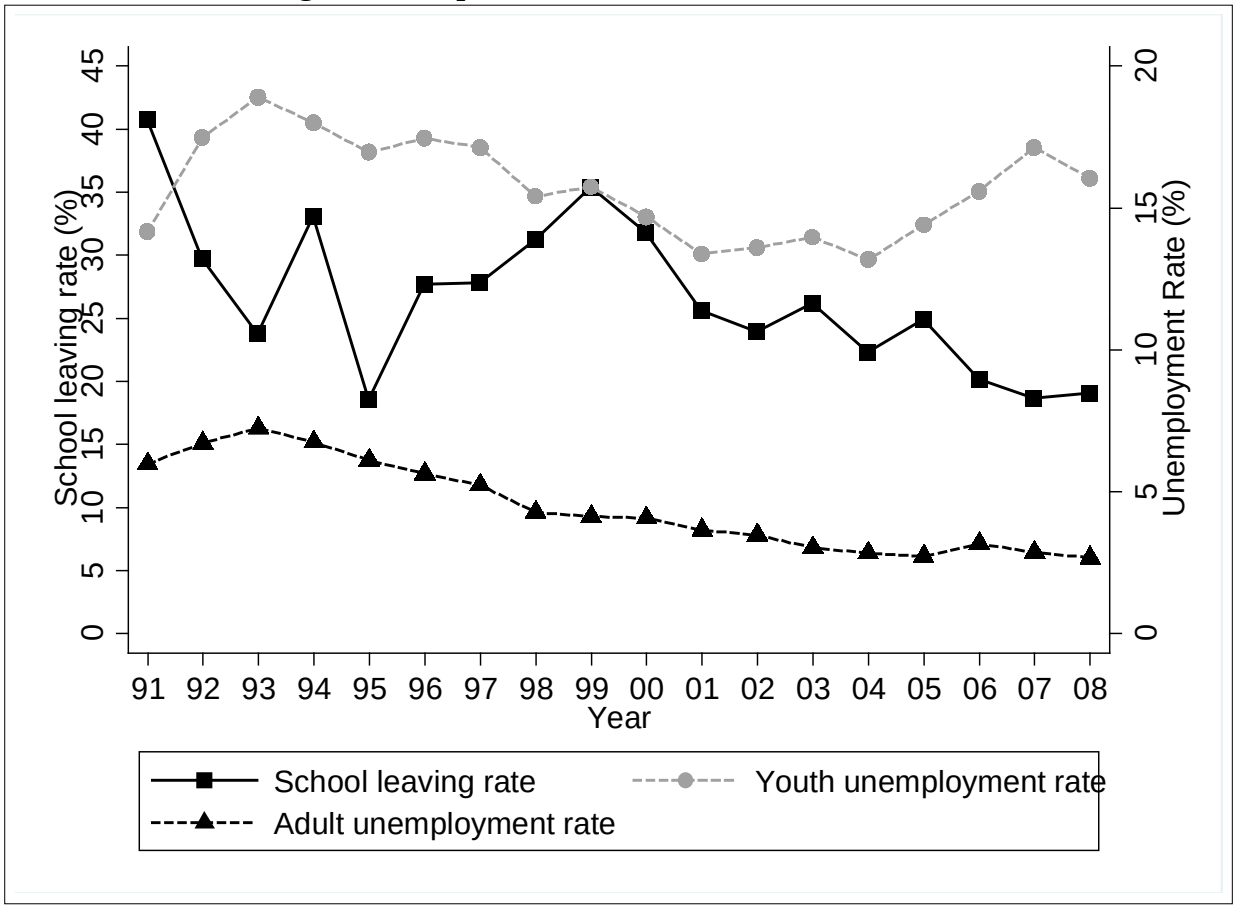

Table 1: Descriptive Statistics

	N	Mean	Stayers Mean	Leavers Mean	p-value (stayers=leavers)
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
Renters	3998	0.271	0.221	0.414	0.000
Social Housing	3998	0.216	0.170	0.348	0.000
Private Renters	3998	0.055	0.051	0.066	0.079
Highest observed parental education					
ISCED 0-2 / Lower secondary or less	3963	0.488	0.424	0.669	0.000
ISCED 3c-5b / Higher secondary	3963	0.360	0.387	0.283	0.000
ISCED 5a-6 / Degree or more	3963	0.152	0.189	0.048	0.000
Male	4065	0.486	0.457	0.567	0.000
Living alone	4065	0.030	0.015	0.072	0.000
Unemployed Parent	3730	0.060	0.053	0.082	0.003
GCSE A*-C / STGR 1-2 obtained					
0	3931	0.278	0.189	0.536	0.000
1 to 4	3931	0.200	0.177	0.266	0.000
5 to 9	3931	0.364	0.429	0.177	0.000
10+	3931	0.158	0.205	0.022	0.000
Eq income quintile					
1st	3986	0.249	0.220	0.330	0.000
2nd	3986	0.234	0.225	0.260	0.024
3rd	3986	0.227	0.223	0.235	0.434
4th	3986	0.173	0.193	0.117	0.000
5th	3986	0.117	0.139	0.057	0.000
Has younger sibling	4065	0.544	0.555	0.512	0.015
Has older sibling	4065	0.379	0.376	0.387	0.543

Table 2: Determinants of leaving school at age 16

	(1) M1	(2) M2	(3) M3	(4) M4-LPM
Youth unemployment rate	-0.025	-0.029*	-0.016	-0.003
	(-1.63)	(-1.79)	(-0.92)	(-1.05)
Adult unemployment rate	-0.007	0.036	-0.014	-0.000
	(-0.20)	(0.98)	(-0.38)	(-0.08)
Home owner (Ref.)				
Renter	0.524***	0.234*	0.199	0.032
	(3.94)	(1.84)	(0.90)	(0.93)
Renter:*Youth unemployment rate			-0.035**	-0.006**
			(-2.42)	(-2.56)
Renter:*Adult unemployment rate			0.137***	0.025***
			(3.90)	(3.07)
GCSEs grade A*-C / STGR : 0 (Ref.)				
1-4		-0.542***	-0.520***	-0.123***
		(-6.23)	(-5.91)	(-5.44)
5-9		-1.706***	-1.692***	-0.313***
		(-15.95)	(-15.53)	(-15.80)
10+		-2.926***	-2.934***	-0.368***
		(-15.89)	(-15.91)	(-15.80)
Household Income: 1st Quintile (Ref.)				
2nd	-0.080	-0.014	-0.024	-0.003
	(-0.73)	(-0.12)	(-0.20)	(-0.15)
3rd	-0.000	0.151	0.140	0.021
	(-0.00)	(1.16)	(1.07)	(1.02)
4th	-0.382**	-0.217	-0.217	-0.026
	(-2.20)	(-1.28)	(-1.29)	(-1.12)
5th	-0.519**	-0.211	-0.195	-0.020
	(-2.12)	(-0.88)	(-0.82)	(-0.64)
Parental Education: less than lower secondary (Ref.)				
Higher secondary / Vocational	-0.448***	-0.266**	-0.269**	-0.051**
	(-3.91)	(-2.13)	(-2.16)	(-2.68)
Degree or more	-1.375***	-0.852***	-0.863***	-0.098***
	(-6.49)	(-3.62)	(-3.67)	(-3.68)
Male	0.730***	0.488**	0.482**	0.071**
	(3.80)	(2.28)	(2.25)	(2.31)
Lives alone	1.158***	0.957***	0.942***	0.207***
	(4.67)	(2.83)	(2.75)	(3.05)
Unemployed parent	0.133	0.025	0.016	0.004
	(0.56)	(0.10)	(0.06)	(0.07)
Has older siblings	0.183**	0.111	0.116	0.016
	(2.27)	(1.43)	(1.46)	(1.27)
Has younger siblings	-0.146	-0.160	-0.164	-0.023
	(-1.22)	(-1.19)	(-1.24)	(-1.19)
_cons	-1.038*	-0.551	-0.684	0.389***
	(-1.71)	(-0.80)	(-0.99)	(3.93)
region dummies	Yes	Yes	Yes	Yes
wave dummies	Yes	Yes	Yes	Yes
N	3635	3556	3556	3556

Estimates of M1- M3 are from logit models; estimates of M4 are from a linear probability model; *t* statistics in parentheses. Standard errors clustered by region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Average Marginal Effects, M1 to M4-LPM

	M1			M2			M3			M4-LPM		
	AME	se	Pvalue	AME	se	pvalue	AME	se	pvalue	AME	se	pvalue
Youth UR	-0.004	0.002	0.091	-0.004	0.002	0.066	-0.004	0.002	0.077	-0.004	0.002	0.099
Adult UR	-0.001	0.006	0.843	0.005	0.006	0.332	0.005	0.006	0.380	0.006	0.006	0.270
Renter	0.093	0.025	0.000	0.036	0.020	0.079	0.038	0.020	0.057	0.047	0.023	0.061
GCSE A*-C / STGR 1-2												
1-4	.	.	.	-0.116	0.020	0.000	-0.111	0.020	0.000	-0.123	0.023	0.000
5-9	.	.	.	-0.301	0.019	0.000	-0.297	0.019	0.000	-0.313	0.020	0.000
10+	.	.	.	-0.392	0.023	0.000	-0.390	0.023	0.000	-0.368	0.023	0.000

Table 4: Effects of unemployment rates by housing tenure, M3 and M4-LPM

		M3			M4-LPM		
		AME	se	pvalue	AME	se	pvalue
Youth unemployment rate							
	Home owner	-0.002	0.002	0.351	-0.003	0.002	0.308
	Renter	-0.010	0.003	0.005	-0.008	0.003	0.014
Diff (R-HO)		-0.007	0.003	0.003	-0.006	0.002	0.020
Adult unemployment rate							
	Home owner	-0.002	0.005	0.705	-0.000	0.005	0.934
	Renter	0.023	0.009	0.009	0.025	0.009	0.016
Diff (R-HO)		0.025	0.007	0.000	0.025	0.008	0.007

Table 5: Effects of unemployment rates by housing tenure at fixed values of covariates*, M3

		M3		
		ME	se	pvalue
Youth unemployment rate				
	Home owner	-0.003	0.003	0.366
	Renter	-0.009	0.003	0.005
Diff (R-HO)		-0.007	.	0.005
Adult unemployment rate				
	Home owner	-0.002	0.006	0.708
	Renter	0.022	0.009	0.010
Diff (R-HO)		0.024	.	0.001

Covariates are fixed at the following values: 5 to 9 GCSE A-C / STGR 1-2; female; living with her parents; max parental education=higher secondary; parents in employment; 3rd household income quintile; no older siblings living in the household; no younger siblings living in the household; resident in south Yorkshire; wave=11

Table 6: Determinants of leaving school at age 16, M5 to M8-LPM

	(1) M5	(2) M6	(3) M7	(4) M8-LPM
Youth unemployment rate	-0.025	-0.029*	-0.015	-0.002
	(-1.64)	(-1.79)	(-0.88)	(-0.99)
Adult unemployment rate	-0.007	0.037	-0.015	-0.001
	(-0.20)	(0.98)	(-0.40)	(-0.11)
Private renters	0.359**	0.277*	0.543	0.094
	(2.22)	(1.75)	(0.73)	(0.84)
Private Renter: *Youth unemployment rate			-0.007	-0.001
			(-0.11)	(-0.09)
Private renter: *Adult unemployment rate			-0.045	-0.010
			(-0.42)	(-0.59)
Social housing: *Youth unemployment rate			-0.039***	-0.007**
			(-2.81)	(-2.83)
Social housing: *Adult unemployment rate			0.173***	0.033***
			(4.57)	(3.89)
GCSEs grade A*-C / STGR : 0 (Ref.)				
1-4		-0.543***	-0.520***	-0.123***
		(-6.20)	(-5.75)	(-5.34)
5-9		-1.708***	-1.693***	-0.312***
		(-15.51)	(-14.53)	(-14.68)
10+		-2.928***	-2.928***	-0.366***
		(-15.78)	(-16.27)	(-15.06)
Household Income: 1st Quintile (Ref.)				
2nd	-0.074	-0.015	-0.024	-0.003
	(-0.69)	(-0.13)	(-0.19)	(-0.13)
3rd	0.006	0.150	0.143	0.022
	(0.04)	(1.13)	(1.05)	(1.02)
4th	-0.378**	-0.217	-0.212	-0.025
	(-2.16)	(-1.28)	(-1.23)	(-1.05)
5th	-0.518**	-0.211	-0.198	-0.020
	(-2.12)	(-0.88)	(-0.83)	(-0.66)
Parental Education: less than lower secondary (Ref.)				
Higher secondary / Vocational	-0.442***	-0.268**	-0.269**	-0.050**
	(-3.91)	(-2.19)	(-2.19)	(-2.67)
Degree or more	-1.354***	-0.856***	-0.852***	-0.097***
	(-6.43)	(-3.70)	(-3.68)	(-3.74)
Male	0.729***	0.488**	0.480**	0.071**
	(3.76)	(2.28)	(2.27)	(2.33)
Lives alone	1.167***	0.955***	0.949***	0.209***
	(4.51)	(2.79)	(2.79)	(3.12)
Unemployed parent	0.128	0.026	0.033	0.007
	(0.53)	(0.10)	(0.12)	(0.14)
Has older siblings	0.180**	0.112	0.120	0.017
	(2.21)	(1.45)	(1.52)	(1.33)
Has younger siblings	-0.148	-0.159	-0.170	-0.024
	(-1.25)	(-1.19)	(-1.27)	(-1.26)
Social housing	0.567***	0.224	0.117	0.018
	(3.82)	(1.48)	(0.56)	(0.53)
_cons	-1.054*	-0.548	-0.721	0.381***
	(-1.72)	(-0.79)	(-1.00)	(3.69)
region dummies	Yes	Yes	Yes	Yes
wave dummies	Yes	Yes	Yes	Yes
N	3635	3556	3556	3556

Estimates of M5- M7 are from logit models; estimates of M8 are from a linear probability model; *t* statistics in parentheses. Standard error clustered by region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Marginal Effects M5 to M8-LPM

	M5			M6			M7			M8-LPM		
	AME	se	pvalue	AME	se	pvalue	AME	se	pvalue	AME	se	pvalue
Youth UR	-0.004	0.003	0.090	-0.004	0.002	0.066	-0.004	0.002	0.087	-0.004	0.002	0.112
Adult UR	-0.001	0.006	0.837	0.005	0.006	0.330	0.005	0.006	0.400	0.006	0.006	0.289
Private renter	0.062	0.030	0.038	0.042	0.026	0.098	0.039	0.027	0.154	0.039	0.026	0.154
Social Housing	0.102	0.028	0.000	0.034	0.024	0.154	0.038	0.024	0.110	0.049	0.029	0.112
GCSE A*-C / STGR 1-2												
1-4	.	.	.	-0.116	0.021	0.000	-0.111	0.021	0.000	-0.123	0.023	0.000
5-9	.	.	.	-0.301	0.020	0.000	-0.297	0.021	0.000	-0.312	0.021	0.000
10+	.	.	.	-0.392	0.023	0.000	-0.390	0.023	0.000	-0.366	0.024	0.000

Table 8: Effects of unemployment rates by housing tenure, M7 and M8-LPM

	M7			M8-LPM		
	AME	se	pvalue	AME	se	pvalue
Youth unemployment rate						
Home owner	-0.002	0.002	0.372	-0.002	0.002	0.336
Private Renters	-0.003	0.009	0.698	-0.003	0.008	0.707
Social Housing	-0.011	0.004	0.010	-0.009	0.004	0.019
Diff (HO-SH)	0.009	0.003	0.002	0.007	0.002	0.011
Diff (PR-SH)	0.007	0.010	0.488	0.006	0.009	0.523
Adult unemployment rate						
Home owner	-0.002	0.005	0.689	-0.001	0.005	0.913
Private Renters	-0.010	0.018	0.590	-0.011	0.018	0.546
Social Housing	0.031	0.009	0.001	0.033	0.009	0.003
Diff (HO-SH)	-0.033	0.007	0.000	-0.033	0.009	0.001
Diff (PR-SH)	-0.040	0.019	0.030	-0.044	0.019	0.030

Table 9: Effects of unemployment rates by housing tenure at fixed values of covariates*, M7

	M7		
	AME	se	pvalue
Youth unemployment rate			
Home owner	-0.002	0.003	0.388
Private Renters	-0.004	0.010	0.686
Social Housing	-0.010	0.004	0.015
Diff (HO-SH)	0.007		0.004
Diff (R-SH)	0.006		0.615
Adult unemployment rate			
Home owner	-0.002	0.006	0.694
Private Renters	-0.011	0.021	0.610
Social Housing	0.028	0.009	0.002
Diff (HO-SH)	-0.031		0.000
Diff (PR-SH)	-0.039		0.106

Covariates are fixed at the following values: 5 to 9 GCSE A-C / STGR 1-2; female; living with her parents; max parental education=higher secondary; parents in employment; 3rd household income quintile; no older siblings living in the household; no younger siblings living in the household; resident in south Yorkshire; wave=11

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Appendix

Table A1: Model estimates – M9 and M10-LPM

	(1) M9	(2) M10-LPM
Youth unemployment rate	-0.061***	-0.010***
	(-3.61)	(-3.27)
Adult unemployment rate	0.133**	0.026**
	(2.32)	(2.54)
GCSEs grade A*-C / STGR : 0 (Ref.)		
1-4	-0.538***	-0.126***
	(-6.28)	(-5.63)
5-9	-1.708***	-0.315***
	(-16.65)	(-16.06)
10+	-2.939***	-0.367***
	(-15.80)	(-15.98)
Household Income: 1st Quintile (Ref.)		
2nd	-0.061	-0.007
	(-0.19)	(-0.13)
3rd	-0.223	-0.022
	(-0.79)	(-0.48)
4th	0.190	0.015
	(0.43)	(0.25)
5th	-0.507	-0.039
	(-0.68)	(-0.43)
2st Quintile: *Youth Unemployment	0.037	0.006
	(1.38)	(1.42)
2st Quintile: *Adult Unemployment	-0.127	-0.022
	(-1.63)	(-1.54)
3rd Quintile: *Youth Unemployment	0.054**	0.008*
	(2.14)	(1.84)
3rd Quintile: *Adult Unemployment	-0.111*	-0.018
	(-1.73)	(-1.56)
4th Quintile: *Youth Unemployment	0.023	0.006
	(0.69)	(1.51)
4th Quintile: *Adult Unemployment	-0.178**	-0.033**
	(-2.06)	(-2.78)
5th Quintile: *Youth Unemployment	0.080**	0.011**
	(2.20)	(2.25)
5th Quintile: *Adult Unemployment	-0.217**	-0.034***
	(-2.55)	(-2.94)
Home owner (Ref.)		
Renter	0.243*	0.046*
	(1.88)	(1.95)
Parental Education: less than lower secondary (Ref.)		
Higher secondary / Vocational	-0.268**	-0.050**
	(-2.11)	(-2.62)
Degree or more	-0.878***	-0.101***
	(-3.76)	(-3.75)
Male	0.497**	0.074**
	(2.36)	(2.40)
Lives alone	0.963***	0.210***
	(2.79)	(3.14)
Unemployed parent	0.016	0.003
	(0.06)	(0.06)
Has older siblings	0.119	0.016
	(1.51)	(1.26)
Has younger siblings	-0.161	-0.023
	(-1.18)	(-1.14)
_cons	-0.559	0.406***
	(-0.90)	(4.29)

region dummies	Yes	Yes
wave dummies	Yes	Yes
N	3556	3556

Estimates of M9 are from a logit model; estimates of M10 are from a linear probability model; *t* statistics in parentheses. Standard error clustered by region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A2: Average marginal effects, M9 and M10-LPM

	M9			M10-LPM		
	AME	se	pvalue	AME	se	pvalue
Youth UR	-0.004	0.002	0.041	-0.005	0.002	0.067
Adult UR	0.005	0.006	0.366	0.007	0.006	0.252
2nd Quintile	-0.006	0.018	0.754	-0.005	0.021	0.822
3rd Quintile	0.020	0.018	0.264	0.020	0.020	0.315
4th Quintile	-0.033	0.024	0.177	-0.027	0.024	0.262
5th Quintile	-0.027	0.033	0.400	-0.018	0.029	0.541
1-4 GCSE-STRGR	-0.115	0.020	0.000	-0.126	0.022	0.000
5-9 GCSE-STGR	-0.300	0.019	0.000	-0.315	0.020	0.000
10+ GCSE-STGR	-0.392	0.023	0.000	-0.367	0.023	0.000

Table A3: Average marginal effects, M9 and M10-LPM, by income quintile

	M9			M10-LPM		
	AME	se	pvalue	AME	se	pvalue
Youth unemployment rate						
1st Quintile	-0.011	0.003	0.000	-0.010	0.003	0.004
2nd Quintile	-0.004	0.004	0.293	-0.004	0.004	0.284
3rd Quintile	-0.001	0.003	0.687	-0.002	0.003	0.451
4th Quintile	-0.004	0.003	0.159	-0.004	0.003	0.234
5th Quintile	0.002	0.003	0.608	0.001	0.004	0.901
Diff (2Q - 1Q)	0.007	0.005	0.126	0.006	0.004	0.174
Diff (3Q - 1Q)	0.010	0.004	0.017	0.008	0.004	0.083
Diff (4Q - 1Q)	0.006	0.004	0.127	0.006	0.004	0.148
Diff (5Q - 1Q)	0.013	0.004	0.001	0.011	0.005	0.037
Adult unemployment rate						
1st Quintile	0.024	0.010	0.019	0.026	0.010	0.020
2nd Quintile	0.001	0.011	0.920	0.004	0.012	0.742
3rd Quintile	0.003	0.006	0.590	0.008	0.007	0.273
4th Quintile	-0.005	0.009	0.563	-0.007	0.009	0.411
5th Quintile	-0.008	0.007	0.259	-0.008	0.008	0.326
Diff (2Q - 1Q)	-0.023	0.013	0.084	-0.022	0.014	0.141
Diff (3Q - 1Q)	-0.020	0.011	0.057	-0.018	0.012	0.136
Diff (4Q - 1Q)	-0.029	0.012	0.020	-0.033	0.012	0.012
Diff (5Q - 1Q)	-0.032	0.010	0.003	-0.034	0.012	0.009

Table A4: Model estimates – M11 and M12

	(1) M11	(2) M12
Youth unemployment rate	-0.002	-0.006
	(-0.08)	(-0.30)
Adult unemployment rate	-0.095	-0.003
	(-0.85)	(-0.05)
Home owner (Ref.)		
Renter	0.155	0.111
	(0.32)	(0.36)
Renter:*Youth unemployment rate	-0.045	-0.028
	(-1.08)	(-1.33)
Renter:*Adult unemployment rate	0.270**	0.131***
	(2.08)	(2.70)
Expect to leave school at age 16: No (Ref.)		
Don't know	0.582***	
	(4.31)	
Yes	1.378***	
	(8.10)	
GCSEs grade A*-C / STGR : 0 (Ref.)		
1-4		-0.685***
		(-7.08)
5-9		-1.859***
		(-14.70)
10+		-3.287***
		(-12.39)
Household Income: 1st Quintile (Ref.)		
2nd	0.134	-0.105
	(1.05)	(-0.67)
3rd	0.289	0.287***
	(1.50)	(2.86)
4th	0.011	-0.174
	(0.06)	(-1.06)
5th	-0.182	-0.308
	(-0.55)	(-1.27)
Parental Education: less than lower secondary (Ref.)		
Higher secondary / Vocational	-0.372***	-0.213*
	(-2.59)	(-1.68)
Degree or more	-0.944***	-0.649**
	(-4.39)	(-2.23)
Male	0.605***	0.304
	(3.29)	(1.49)
Lives alone	1.400**	1.132***
	(2.38)	(4.27)
Unemployed parent	0.056	0.141
	(0.15)	(0.46)
Has older siblings	0.308*	0.123
	(1.81)	(0.99)
Has younger siblings	0.093	-0.085
	(0.48)	(-0.64)
_cons	-1.151	-0.534
	(-1.14)	(-0.72)
region dummies	Yes	Yes
wave dummies	Yes	Yes
N	1532	2336

Estimates of M11 and M12 are from logit models; *t* statistics in parentheses. Standard error clustered by region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A5: Average marginal effects, M11 and M12, by housing tenure

	M11			M12		
	AME	se	pvalue	AME	se	pvalue
Youth unemployment rate						
Home owner	-0.000	0.003	0.935	-0.001	0.003	0.766
Renter	-0.008	0.006	0.183	-0.006	0.004	0.099
Diff (HO-R)	-0.008	0.007	0.239	-0.005	0.003	0.112
Adult unemployment rate						
Home owner	-0.013	0.015	0.392	-0.000	0.006	0.959
Renter	0.031	0.019	0.099	0.023	0.011	0.030
Diff (HO-R)	0.045	0.020	0.028	0.024	0.009	0.006