

The impact of the minimum wage regime on the education and labour market choices of young people: a report to the Low Pay Commission

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Executive summary

The aim of this report is to provide evidence on the impact of local labour market conditions in general – and the national minimum wage (NMW) in particular – on the education and labour market choices of young people in the UK. It will provide policymakers with a better understanding of the factors driving young people’s transitions from full-time education into the labour market, and the sensitivity of decisions about these to changes in wages, including the NMW regime. Such evidence will be critically important for NMW policy in the future, as it responds to changing (and arguably difficult) labour market conditions and the introduction of other policies that may impact on the youth labour market, such as the raising of the education participation age.

This report provides five pieces of interrelated evidence on the impact of local labour market conditions on young people’s education and labour market choices:

- 1) We use data from the Labour Force Survey (LFS)¹ and the Annual Survey of Hours and Earnings (ASHE)² to provide descriptive evidence on the role of local labour market conditions in young people’s education and labour market choices, by showing how education participation rates, employment rates, earnings and hours worked have changed amongst young people aged 16–17 and 18–21 over the last 10 years and in particular over the course of the 2008–09 recession.
- 2) We build on the work by De Coulon et al. (2010) for the Low Pay Commission (LPC), and model the education and labour market choices made by a recent cohort of young people entering the labour market during and immediately after the 2008–09 recession, using data from the Longitudinal Study of Young People in England (LSYPE).³ To more systematically identify the effect of local labour market conditions on these choices, we include measures of youth wages and youth unemployment rates in our models – alongside a rich set of individual and family background characteristics – with identification coming through regional variation in these rates.
- 3) We examine the impact of the introduction of the 16–17 rate of the NMW in October 2004 on the education and labour market choices of these individuals, using data from the LFS. To do so, we take advantage of the fact that the NMW is more likely to ‘bite’ in some regions than others, i.e. it is likely to result in a bigger wage increase for a greater number of individuals in initially low-wage regions than in initially high-wage regions. We then subtract the change in outcomes amongst young people in initially high-wage areas from the change in outcomes amongst young people in initially low-wage areas to identify the net impact of the 16- to 17-year-old rate on education and labour market outcomes.⁴

¹ The LFS is a quarterly survey of UK residents aged 16 and upwards which has been carried out in its current form since 1992. Information is collected by household, with a particular emphasis on the labour market activities of each household member. The LFS has both cross-sectional and longitudinal elements: households are interviewed for five consecutive quarters (known as waves) before they are removed from the panel and replaced. Approximately 50,000 households (including around 3,000 16/17-year-olds) are interviewed in each quarter.

² ASHE is based on a 1% sample of employees taken from PAYE records. Detailed information on earnings and hours is obtained from employers for each employee working during the reference period (usually sometime in April).

³ The LSYPE is a longitudinal survey following 15,770 young people in England who were aged 13/14 in 2003–04. It has surveyed these teenagers and their families annually – collecting detailed information about education and labour market choices, as well as background characteristics, attitudes, behaviours and aspirations – with the final wave having taken place in 2010, when the young people were aged 19/20.

⁴ This is known in the literature as a difference-in-differences model. The validity of this approach is governed by the fundamentally untestable assumption of ‘common trends’, which is that in the absence of the policy, the change in outcomes over the relevant period would have been the same for the treatment and control groups, conditional on all other factors.

- 4) We investigate the impact of entitlement to the development rate of the NMW (available to 18- to 21-year-olds) on the education and labour market choices of 18-year-olds, by comparing the outcomes of individuals who we observe just before their 18th birthday with those of people we observe just after they turn 18. The idea behind this approach is that individuals born just a few months apart should be very similar in all respects other than their entitlement to different NMW rates.⁵ We also investigate whether the effect (of turning 18 and becoming eligible for a different NMW rate) has changed over time, particularly since the 2008–09 recession.
- 5) Lastly, we model the impact of the reduction in the age of entitlement to the adult rate of the NMW from 22 to 21 in October 2010 on a range of education and labour market decisions, using a similar approach to that outlined above for our analysis of the impact of the 16- to 17-year-old rate. To do so, we compare the change in outcomes over time amongst 20-year-olds (whose entitlement to the NMW did not change over this period) with the change in outcomes over time amongst 21-year-olds.

It is clear that there have been significant changes in young people's education and labour market choices over the last 10 years. In particular, the proportion of 16- to 17-year-olds in full-time education has increased substantially and the proportion in work has fallen by about the same amount. These patterns accelerated during the 2008–09 recession. Of particular note is the fact that education participation increased dramatically amongst 16- to 17-year-olds without a Level 2 qualification (equivalent to five GCSEs at grades A*–C) during the recession, suggesting that this group may have been choosing to stay in education longer than they otherwise would have done in order to avoid the prospect of becoming NEET (not in education, employment or training). By contrast, the proportion of 18- to 21-year-olds who are NEET has increased substantially over the course of the recession – particularly amongst the lowest-educated – while the proportion in full-time education has barely risen. This suggests, as we might expect, that there are greater barriers to participation in full-time education as a response to changing labour market conditions for 18- to 21-year-olds than for 16- to 17-year-olds.

In considering the effect of local labour market conditions on young people's education and employment choices in a more systematic way, however, our analysis suggests that these conditions are having very little *causal* effect on young people's decisions. Using data from the LSYPE, our results show that – after accounting for a wide range of individual and school characteristics – local youth wage rates do not affect the main education or employment choices made by young people between the ages of 16 and 19. This suggests that changes in the 16- to 17-year-old or development rates of the NMW are unlikely to have a direct impact on the main activities young people choose to undertake.

These results can be reconciled with the descriptive evidence outlined above if we believe that young people base their expectations about the returns to education on national rather than local labour market conditions, and thus are more likely to respond to differences across time than between areas. It could also be that our descriptive analysis is biased because it does not take full account of different individual characteristics, which are included in our LSYPE analysis.

The conclusion that local wage rates appear to matter very little for young people's education and employment choices is confirmed by our analysis of the impact of entitlement to the NMW, using data from the LFS. For the adult and development rates, we find very little evidence of any significant effects – although the magnitude and sign of our estimates of the impact of entitlement to the development rate provide some support for the notion that the minimum wage might be having a negative effect on young people's education and labour market outcomes, particularly the likelihood of being in full-time education for men. (This result is supported by our finding in the LSYPE that local youth unemployment rates have a positive and significant effect on the likelihood of being in full-time education amongst 18-year-olds.)

⁵ This is known in the literature as a regression discontinuity approach and has been successfully adopted elsewhere to assess changes in entitlement to the NMW (for example, by Dickens, Riley and Wilkinson (2010), Rice (2010) and Fidrmuc and Tena Horrillo (2011)).

However, we did not find any evidence that the effect of entitlement to the development rate became more negative after the recent recession.

We do not wish to place too much emphasis on the results of our analysis of the development rate, however, as none of the estimates is significantly different from zero; moreover, there are other policy and psychological discontinuities that occur as individuals turn 18 that might also affect young people's decisions, such that our identification strategy works less well in this context. This means that, conservatively speaking, these results are probably better interpreted as the impact of turning 18 than as the impact of becoming entitled to the development rate per se.

We did not find any impact of the 16- to 17-year-old rate on the probability of staying in full-time education, the probability of being NEET, or the probability of working conditional on not being in full-time education either. We did, however, find evidence of a statistically significant *positive* impact of the 16- to 17-year-old rate on the probability of working among full-time students in low-wage areas relative to high-wage areas.⁶ This suggests that while young people's main choices between education and work were not affected by the introduction of the 16- to 17-year-old rate, the more marginal decision of whether to take a part-time job while studying appears to have been positively affected by the increase in the expected return to part-time work in low-wage areas. In line with this conclusion, our LSYPE analysis also suggests that higher local youth unemployment rates negatively affect the likelihood of working whilst in full-time education, but have relatively little impact on young people's main activity choices (except where noted above).

In summary, the results of our comprehensive study of the impact of the minimum wage on the education and labour market choices made by young people in the period leading up to and beyond the 2008–09 recession provide little evidence that the NMW regime has drawn young people out of education and into the labour market, nor that it has adversely affected their employment chances. This generally confirms the findings of previous work produced for the LPC and others, and provides reassurance that recent increases in the NMW (as well as future increases) are unlikely to unduly influence the choices that young people make as they transition out of education and into the labour market.

⁶ We also found evidence of a positive but insignificant effect of entitlement to the development rate on the probability of working amongst those in full-time education for 18-year-olds relative to 17-year-olds.

1 Introduction

1.1 Aims and objectives

The overarching aim of this report is to investigate the impact of local labour market conditions – particularly the national minimum wage (NMW) regime – on young people’s education and labour market choices. We build on previous research commissioned by the Low Pay Commission (LPC) and carried out by De Coulon, Meschi, Swaffield, Vignoles and Wadsworth (2010), Fidrmuc and Tena Horrillo (2011) and Dickens, Riley and Wilkinson (2010), who examined the effects of the 16- to 17-year-old, development and adult rates of the NMW respectively on young people’s education and employment choices.⁷

This report adds to this evidence base in two key ways. First, we estimate the effect of local labour market conditions, and the NMW regime specifically, on a wider range of education and labour market outcomes – including the decision to drop out of full-time education, the likelihood of combining full-time education and work, and the probability of being NEET (not in education, employment or training) – as well as the likelihoods of being in full-time education or in work, which are more commonly assessed.

Second, we update the analysis to consider how these effects may have changed over time. Since the original analysis was undertaken, the UK – in common with most of the rest of the developed world – has experienced a deep recession, lasting well over a year. This is likely to have had a profound effect on the labour market options of young people, and our analysis will investigate how these changing labour market conditions have affected the impact of the NMW on these choices.

There are also key policy changes to consider. The Education Maintenance Allowance (EMA) – which provided means-tested support for 16- to 19-year-olds in full-time post-compulsory education – has now been abolished and replaced by a new bursary scheme.⁸ The EMA was found to have a positive impact on the likelihood of participating in full-time post-compulsory education (Dearden et al., 2009), which may have helped to offset any encouragement that the NMW might have provided to draw young people out of education and into the labour market. Depending on the effectiveness of the new bursary scheme, this may potentially change the effects of the NMW regime in future. While we will not be able to assess these effects directly, we will be able to use our analysis to provide some insight into the likely effects of this change on young people’s education and employment decisions.

At the same time, the government is increasing the minimum age at which young people in England can leave learning. The Education and Skills Act 2008 requires them to continue in education or training until the end of the academic year in which they turn 17 from 2013, and until the end of the academic year in which they turn 18 from 2015. Raising the participation age (RPA) does not mean that all young people must stay in full-time education; they will also be able to undertake work-based learning, such as an apprenticeship, or part-time education or training if they are employed, self-employed or volunteering for more than 20 hours a week.⁹ This will affect the labour market choices that are open to young people, meaning that it has become more important than ever to understand how these decisions are affected by wages in general and by the NMW regime in particular.

⁷ A minimum wage was reintroduced in the UK in April 1999 and comprised an adult rate – applying to those aged 22 plus – at £3.60 per hour, and a development rate – applying to those aged 18–21 – at £3 per hour. It was not until October 2004 that further legislation was introduced to cover 16- to 17-year-olds as well, at a lower rate of £3 per hour (compared with £4.10 for 18- to 21-year-olds and £4.85 for adults). In October 2010, the age of entitlement to the adult rate of the minimum wage was reduced from 22 to 21.

⁸ For more details, see <http://www.education.gov.uk/inthenews/pressnotices/a0076112/180-million-new-bursary-scheme-to-help-the-most-vulnerable-16-19-year-olds>.

⁹ For more details of this change, see <http://www.education.gov.uk/16to19/participation/rpa>.

The research we are undertaking will provide policymakers with a better understanding of young people's transitions from full-time education into the labour market, and the sensitivity of decisions about these to changes in wages, including those brought about by the NMW regime. Such evidence will be critically important when considering future changes to minimum wage policy in light of shifting labour market conditions and the introduction of other policies that are likely to affect the youth labour market.

1.2 Theoretical framework

The impact of the minimum wage on education and labour market choices depends crucially on the relative elasticities of the supply of and demand for labour and, indeed, the level of the minimum wage itself (see, for example, Manacorda, Manning and Wadsworth (2006)). We consider young people's education and labour market choices in the context of the human capital investment model, which proposes that an individual will invest in additional schooling only if the expected benefits from further education exceed the expected costs.¹⁰

The expected returns to further education include higher expected wages and/or a lower risk of unemployment. The costs of further education include the direct costs (for example, transport costs or books), the non-monetary costs (for example, the individual's own cost of effort in school or dislike of studying) and the opportunity cost of schooling (which amounts to the earnings and labour market experience that are forgone while an individual remains in education).

For any given expected return to education, young people with a cost of education below this level will choose to invest in additional schooling (as expected future benefits outweigh costs), while young people with a cost of education above this level will choose otherwise.

Our focus is on the impact of local labour market conditions – and the NMW regime specifically – on the education and labour market choices of young people. We must therefore consider the theoretical impact of changes or differences in local labour market conditions – including those induced by the NMW – on the expected costs and benefits of remaining in education, as well as on other outcomes of interest.

Theoretically, the level of local wages has an ambiguous effect on the choice between continuing in education and moving into employment. Higher wages for young people who leave school at the earliest opportunity increase the opportunity costs of further schooling and may encourage earlier entry into the labour market. Higher wages for unskilled occupations may also increase the probability of early entry into the labour market by decreasing the expected returns to education and possibly increasing the returns to experience. By contrast, higher wages for *skilled* occupations imply higher returns to education and thus increase the expected benefits of additional years of schooling.

The local unemployment rate – which may be indirectly influenced by the NMW regime if it is found to affect employment – also has an ambiguous effect on individual demand for education. On the one hand, current high youth unemployment rates may discourage early school-leaving, by reducing the expected gain from job search and by reducing the opportunity cost of schooling. On the other hand, the expected returns to education will increase if the unskilled unemployment rate rises relative to the skilled unemployment rate; if the youth unemployment rate is correlated with the difference between the skilled and unskilled unemployment rates, then high youth unemployment may theoretically decrease the probability of staying on at school after the compulsory leaving age (Micklewright, Pearson and Smith, 1990; Petrongolo and San Segundo, 2002). An increase in adult unemployment rates may also increase the pressure on young people to contribute to the household budget if their parents become unemployed (Clark, 2011).

¹⁰ The human capital investment model was first proposed by Becker (1964) and Ben-Porath (1967) and has been successively extended (see, for example, Card and Lemieux (2001)).

The concept of rational and forward-looking decision-making based on expected costs and returns can be extended to choices between other labour market activities as well. For example, a high level of local youth wages, other things being equal, increases the expected benefit of finding work or training. If firms are able to absorb the increase in costs that results from the introduction of or subsequent increase in the NMW, as in a monopsonistic market (see Manning (2003)), then we may see an increase in employment as young people are drawn into the labour market and out of education, attracted by the higher wages on offer. However, if firms are not able to absorb the increase in costs, then the NMW could potentially depress demand for workers whose wages are affected by the change – particularly the young and the unskilled – which would cause this group to either remain in education longer or have a higher rate of unemployment.

The effect of the minimum wage on the education and employment choices of young people is thus an empirical question, to which we hope to be able to provide some insight in this report.

1.3 Research questions

The specific research questions we address in this report are as follows:

- 1) How did education participation rates, employment and unemployment rates, earnings and hours worked change over the course of the recession and in the 18 months afterwards? Did these patterns differ by age, region, education or other individual background characteristics? What are the implications of these patterns for NMW policy?
- 2) What role do wages – and local labour market conditions more generally – play in determining the labour market outcomes of 16- to 18-year-olds? In particular, we consider: (a) the proportion who stay in full-time education; (b) the proportion who work; (c) the proportion who combine full-time education and work; and (d) the proportion not in education, employment or training (NEET). Does the impact of local labour market conditions differ by prior attainment or family background characteristics?
- 3) What is the impact of the national minimum wage regime amongst individuals aged 16–17 on the education and labour market choices outlined above?
- 4) What is the impact of entitlement to the development rate of the NMW on the education and labour market outcomes of 18- to 20-year-olds? Is there any evidence that the NMW regime adversely affected young people’s employment prospects during the recent recession?
- 5) What is the impact of the reduction in the age of entitlement to the adult rate of the NMW from 22 to 21 in October 2010 on education and labour market choices?

We undertake five related pieces of analysis to address these questions, using data from the Labour Force Survey (LFS), the Annual Survey of Hours and Earnings (ASHE) and the Longitudinal Study of Young People in England (LSYPE). See Box 1.1 for more details on each of these data sets.

First, we use data from the LFS and ASHE to investigate how education participation rates, employment rates, earnings and hours worked changed amongst young people before, during and after the recent recession. We also examine whether these patterns differ by age, region or other individual background characteristics. This analysis provides a more detailed picture of what happened to the labour market outcomes of young people both during and after the recession – and the likely implications for minimum wage policy – than has hitherto been possible.

Box 1.1 Details of the data sets that we use

Labour Force Survey (LFS)

The LFS is a quarterly survey of UK residents aged 16 and above. Information is collected by household, with a particular emphasis on the labour market activities of each household member, including whether they are in work and/or education in each quarter. The LFS has both cross-sectional and longitudinal elements: households are interviewed for five consecutive quarters (known as waves) before they are removed from the panel and replaced. Approximately 50,000 households are interviewed in each quarter, containing around 3,000 16- to 17-year-olds, 5,000 18- to 21-year-olds and 60,000 22- to 64-year-olds. We make use of data from 2000 to 2010.

We use the LFS for our descriptive analysis of young people's education and labour market choices over time in Chapter 2, and for our analysis of the impact of the NMW on the education and labour market outcomes of 16- to 17-year-olds in Chapter 4, 18-year-olds in Chapter 5 and 21-year-olds in Chapter 6.

Annual Survey of Hours and Earnings (ASHE)

ASHE is a 1% random sample of employees in all industries, which means that it covers around 160,000 employees per year. As the name suggests, it focuses primarily on various measures of wages and hours worked. The information collected is obtained directly from employers, which means that it is more accurate than in most surveys (Dustmann, Frattini and Preston, 2007). Importantly for our purposes, it covers around 2,000 16- to 17-year-olds, 8,000–9,000 18- to 21-year-olds and 130,000–160,000 22- to 64-year-olds each year.^a

We use ASHE data for our descriptive analysis of young people's employment status, including wages and hours worked, in Chapter 2, and to define high-, medium- and low-wage areas for our analysis of the impact of the effect of the NMW on young people's education and labour market choices in Chapters 3, 4 and 5. To do so, we make use of data at the unitary authority / county (UA/C) level.^b There are 87 UA/Cs in England, once all London boroughs have been aggregated to 'Greater London', and 141 UA/Cs in Great Britain. The number of individuals in each UA/C varies across the country, from 26,000 in Northumberland to 433,000 in the City of Bristol. We use this somewhat complicated geography as it is the most appropriate level available in each of the three data sets that we use.

Longitudinal Study of Young People in England (LSYPE)

The LSYPE is a longitudinal survey, managed by the Department for Education (DfE), following 15,770 young people in England who were born between 1 September 1989 and 31 August 1990. The young people have been surveyed annually since 2003–04 (when they were aged 13/14) and the latest publicly available data are from 2008–09, when they were aged 18/19. The LSYPE contains a detailed set of background characteristics of the young people, including their attitudes, behaviours and aspirations, and information about their families and schools.

We use LSYPE data to investigate the impact of local labour market conditions – including wages and employment rates – on young people's post-compulsory education and labour market choices at ages 16/17, 17/18 and 18/19.

^a Except in 2004 and 2006, when the sample was boosted.

^b In 1974, a new two-tier system of counties and districts was established across England and Wales. These areas were classified as 'metropolitan' or 'non-metropolitan', where the metropolitan counties represented heavily built-up areas (other than Greater London). Following a local government reorganisation in the 1990s, unitary authorities were established in a number of areas in England, usually in medium-sized urban areas, and these replaced the two-tier system of counties and districts. In other areas, non-metropolitan counties were retained. For more information, see the map at <http://www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/administrative/england/counties/map-of-the-uk-counties-and-unitary-administrations.pdf>.

Second, we build on work by De Coulon et al. (2010) to model the education and labour market choices made by a recent cohort of young people entering the labour market during and immediately after the 2008 recession, using data from the LSYPE. To examine the effect of local labour market conditions on these choices, we include various measures of local youth wage and unemployment rates in our models, with identification coming through regional variation in these rates.

Third, we examine the effects of the introduction of the 16- to 17-year-old rate of the NMW on young people's education and labour market choices, using data from the LFS. To do so, we again make use of regional variation in wage rates. Specifically, we take advantage of the fact that the introduction of this NMW rate is more likely to 'bite' in some regions than others, i.e. it is likely to result in a more substantial wage increase for a greater number of individuals in initially low-wage regions than in initially high-wage regions; thus we might expect its effect to be greater in low-wage than in high-wage regions.

Fourth, we investigate the impact of entitlement to the development rate of the NMW on the education and labour market choices of 18-year-olds, by comparing the outcomes of individuals who we observe just before their 18th birthday with those of people we observe just after they turn 18. This is known as a regression discontinuity design and has been successfully adopted elsewhere to assess changes in entitlement to the NMW (for example, by Dickens, Riley and Wilkinson (2010), Rice (2010) and Fidrmuc and Tena Horrillo (2011)).

Lastly, we model the impact of the reduction in the age of entitlement to the adult rate of the NMW from 22 to 21 in October 2010 on a range of education and labour market decisions. To do so, we compare the change in outcomes over time amongst 20-year-olds (whose entitlement to the NMW did not change over this period) with the change in outcomes over time amongst 21-year-olds.

Of course, we are not the first to consider these issues, and we discuss the existing evidence relating to each of these questions in more detail in the relevant chapters.

This report now proceeds as follows. Chapter 2 provides descriptive evidence on what has happened to the education and labour market choices of individuals aged 16–17, 18–21 and 22–64 since 2000, particularly over the course of the recent recession. Chapter 3 investigates the impact of local labour market conditions, particularly youth wages and unemployment rates, on young people's education and labour market choices using data from the LSYPE, while Chapter 4 looks at the impact of the 16- to 17-year-old rate of the NMW on the same outcomes. Chapter 5 considers how entitlement to the development rate of the NMW affects the education and labour market choices of 18-year-olds, while Chapter 6 investigates the effect of entitlement to the adult rate on the same outcomes amongst 21-year-olds. Chapter 7 concludes.

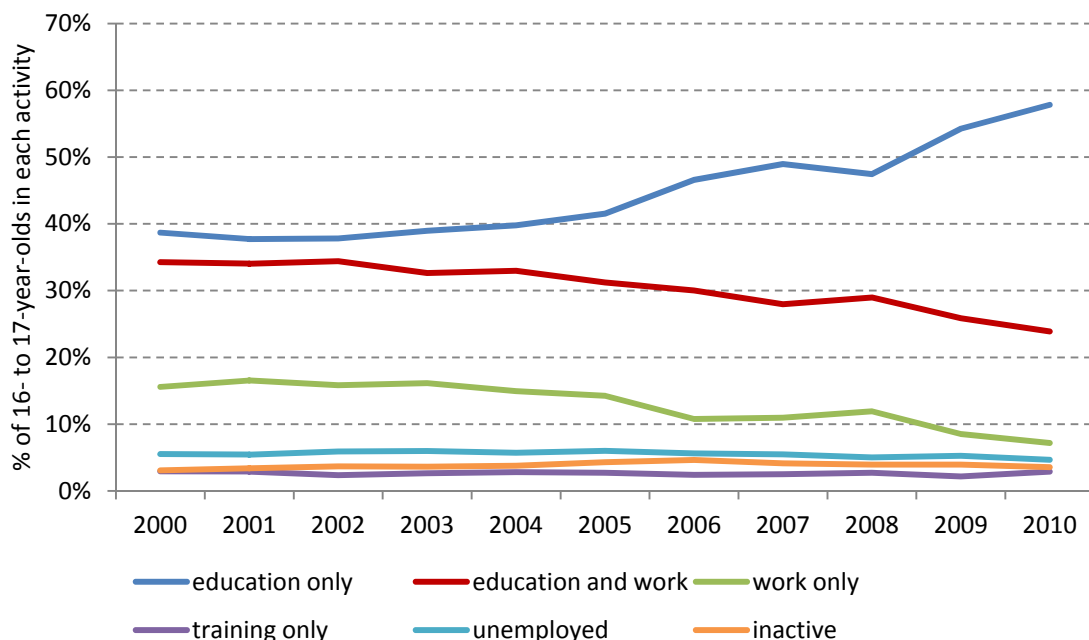
2 Descriptive analysis

This chapter will set the scene in terms of what has been happening to young people’s education and labour market outcomes during the recession in the context of longer-term trends. Section 2.1 starts by showing some basic descriptive statistics on how the education and labour market choices of individuals aged 16–17, 18–21 and 22–64 have changed over time. Section 2.2 focuses on the two younger groups and examines how their education and employment choices differ by gender, ethnicity, qualification level, parental earnings and region. Section 2.3 considers trends in earnings and hours worked amongst our three age groups of interest, while Section 2.4 considers differences in these trends by gender and region. Section 2.5 summarises the analysis. Sections 2.1 and 2.2 are based on information from the Labour Force Survey (LFS), while Sections 2.3 and 2.4 are based on information from the Annual Survey of Hours and Earnings (ASHE).

2.1 Trends in education and labour market choices by age group

Figure 2.1 uses annual data to show that there is a clear long-term trend in the education participation decisions of young people aged 16–17, with the proportion of 16- to 17-year-olds in full-time or part-time education rising from about 72% in the early 2000s to about 76% before the recession, and almost 82% in 2010.¹¹ In fact, the vast majority – about 90% – of these individuals are in full-time education. Meanwhile, the proportion of 16- to 17-year-olds in work has declined over the same period, among both students and school-leavers. There are no obvious long-term trends in the proportions of young people unemployed or inactive (which together equate to the proportion of young people who are NEET, i.e. not in education, employment or training). These overall patterns are the same whether one defines age using academic year¹² or calendar year; we use calendar year throughout this chapter.

Figure 2.1 Education and labour market choices of young people aged 16–17



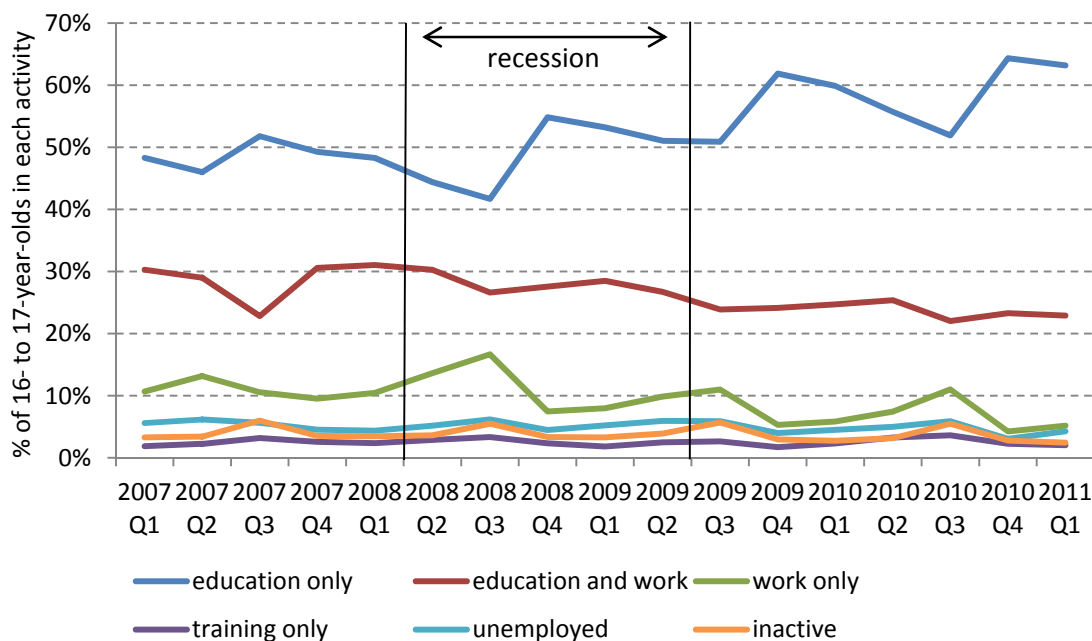
Notes: This analysis is based on data from the Labour Force Survey, calendar year 2000 to 2010.

¹¹ These figures are obtained by summing the proportion of young people in education alone and those in education and work.

¹² Being academic age 16 means being 16 at the start of the academic year in which the quarter of observation falls.

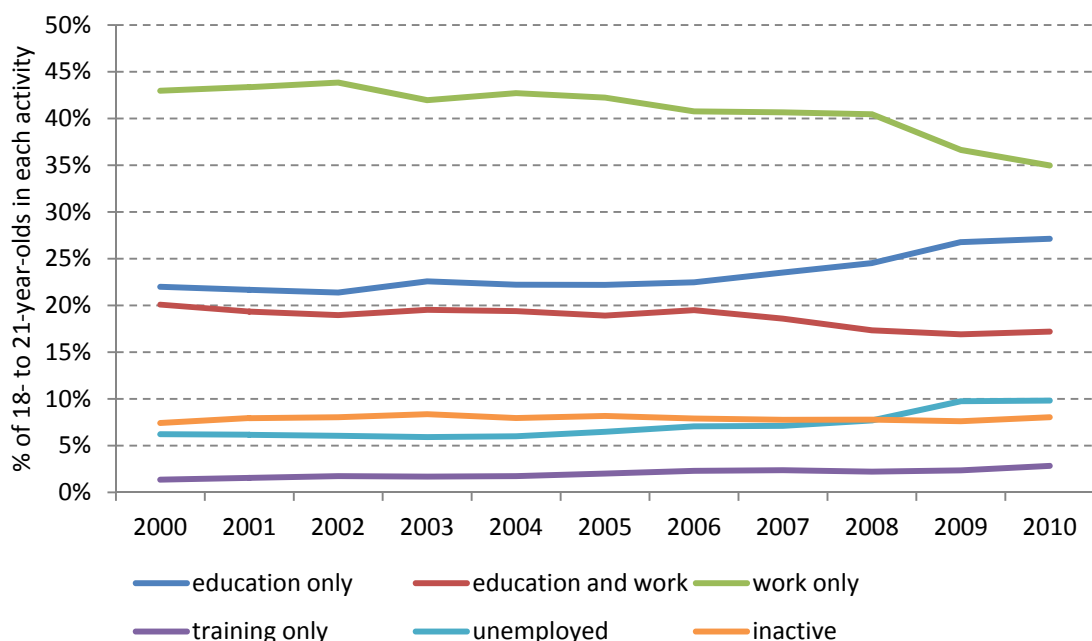
For a closer look at the changes during and after the recession, we examine quarterly data on young people's education and employment choices (see Figure 2.2). Note that there are very strong seasonal patterns in the data. Since the start of the recession in the first quarter of 2008, there has been a modest decline in employment for 16- to 17-year-olds and a commensurate increase in education participation. This has left the proportions of 16- to 17-year-olds who are unemployed and inactive largely unchanged.

Figure 2.2 Education and labour market choices of young people aged 16–17, quarterly data



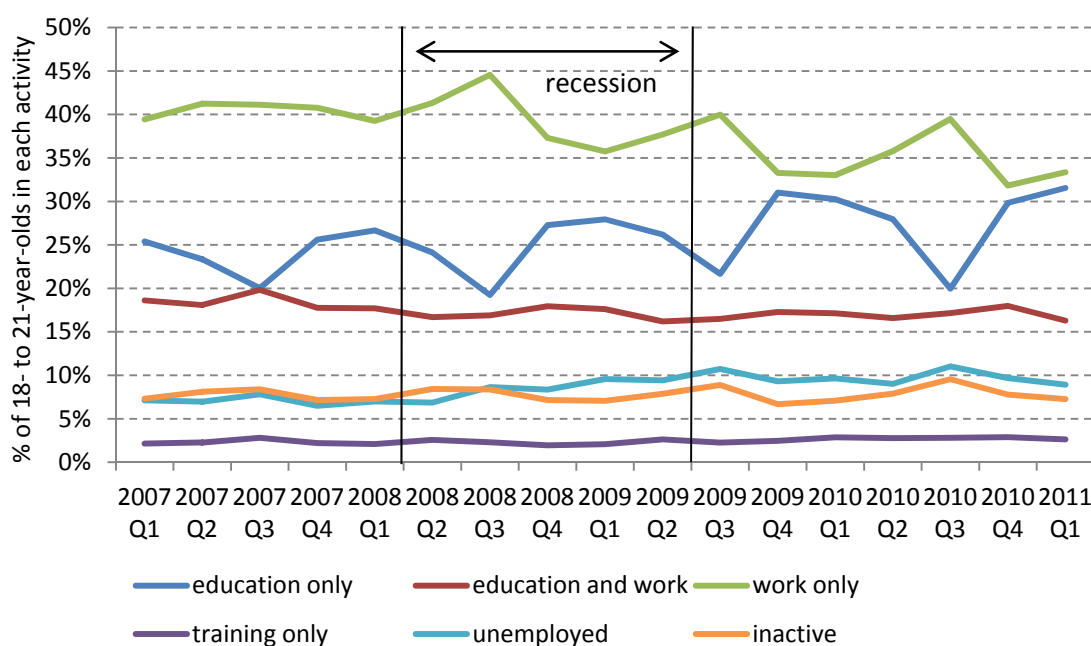
Notes: This analysis is based on data from the Labour Force Survey, 2007Q1 to 2011Q1. The recessionary period is defined on the basis of revised GDP growth figures from the Office for National Statistics, published in November 2011: <http://www.ons.gov.uk/ons/rel/gva/gross-domestic-product-preliminary-estimate/q3-2011/index.html>.

Figure 2.3 Education and labour market choices of young people aged 18–21



Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010.

Figure 2.4 Education and labour market choices of young people aged 18–21, quarterly data

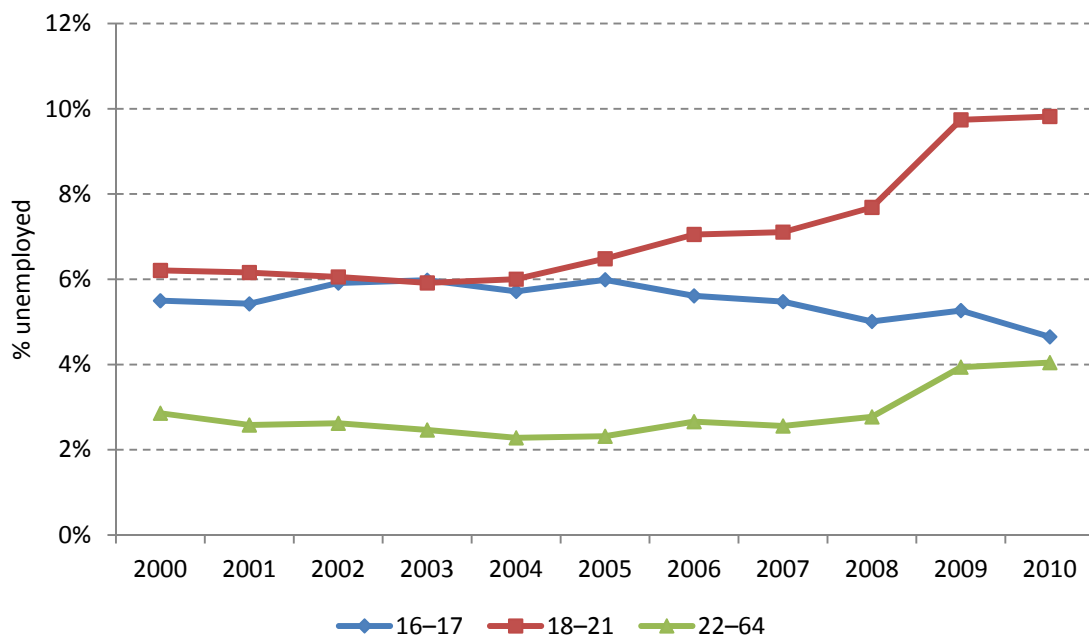


Notes: This analysis is based on data from the Labour Force Survey, 2007Q1 to 2011Q1. The recessionary period is defined on the basis of revised GDP growth figures from the Office for National Statistics, published in November 2011: <http://www.ons.gov.uk/ons/rel/gva/gross-domestic-product--preliminary-estimate/q3-2011/index.html>.

Some of those trends are also observed for 18- to 21-year-olds. As Figures 2.3 and 2.4 show, this age group has experienced a long-term increase in education participation rates and a decline in employment rates, both of which continued during and after the recession. However, this age group has also seen a noticeable increase in unemployment in recent years. The proportion of 18- to 21-year-olds in unemployment stayed around 6% in the early 2000s and rose gradually to about 10% in 2009 and 2010. As seen in Figure 2.4, there was an unambiguous rise in unemployment over the course of the recession by about 3 percentage points, and the high level of unemployment persisted after the recession.

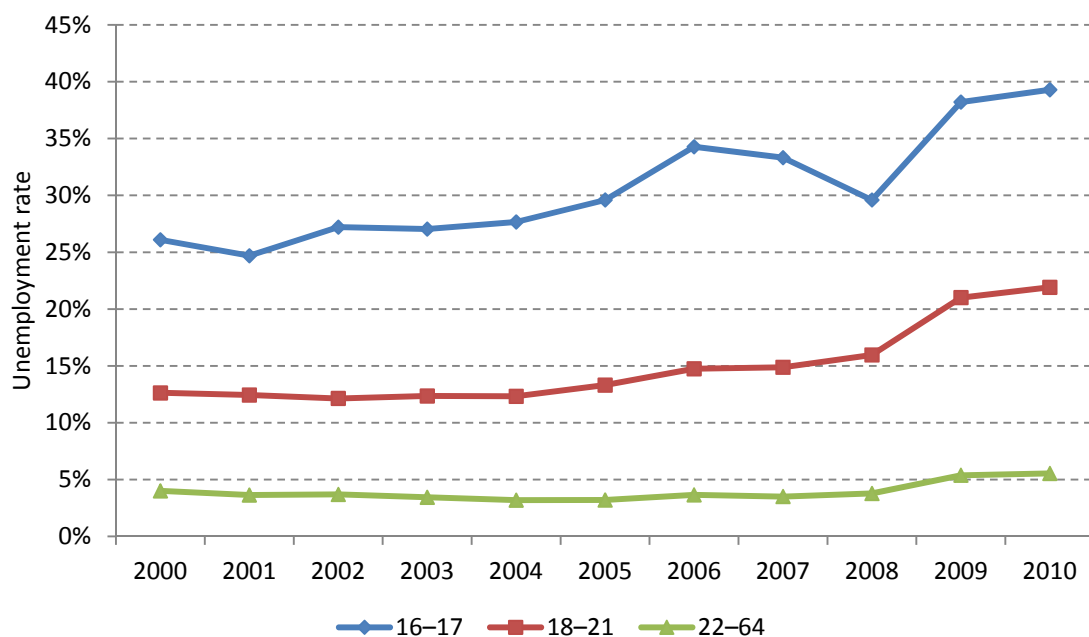
Figures 2.5 and 2.6 explicitly compare the unemployment trends amongst young people with those of working-age adults. Figure 2.5 shows the trend in unemployment proportions by age group, while Figure 2.6 focuses on the unemployment *rate*, i.e. it excludes those in education or unavailable for work. The first thing to note is that the proportion of young people who are unemployed is always higher than the proportion of adults who are unemployed. Second, the impact of the recession differed significantly by age group. While the proportion of adults in unemployment increased from below 3% to 4% in 2009 and that of 18- to 21-year-olds increased from just below 8% to nearly 10%, the proportion of 16- to 17-year-olds who were unemployed stayed almost flat and may even have declined. The decline in unemployment among the youngest group over the period of the recession is, of course, unsurprising given the rapid increase in education participation of this group, although it is an open question as to whether this is simply disguised unemployment, or whether these young people will see genuine benefits from the choices the recession has forced upon them. By contrast, the unemployment *rate* for 16- to 17-year-olds has increased dramatically since 2008, despite the slight fall in the proportion of young people who are unemployed, emphasising the accompanying fall in the number of 16- to 17-year-olds in work.

Figure 2.5 Unemployment proportions by age group over time



Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010.

Figure 2.6 Unemployment rates by age group over time



Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010. The rates represent the number of unemployed people relative to itself plus the number in work and not in education.

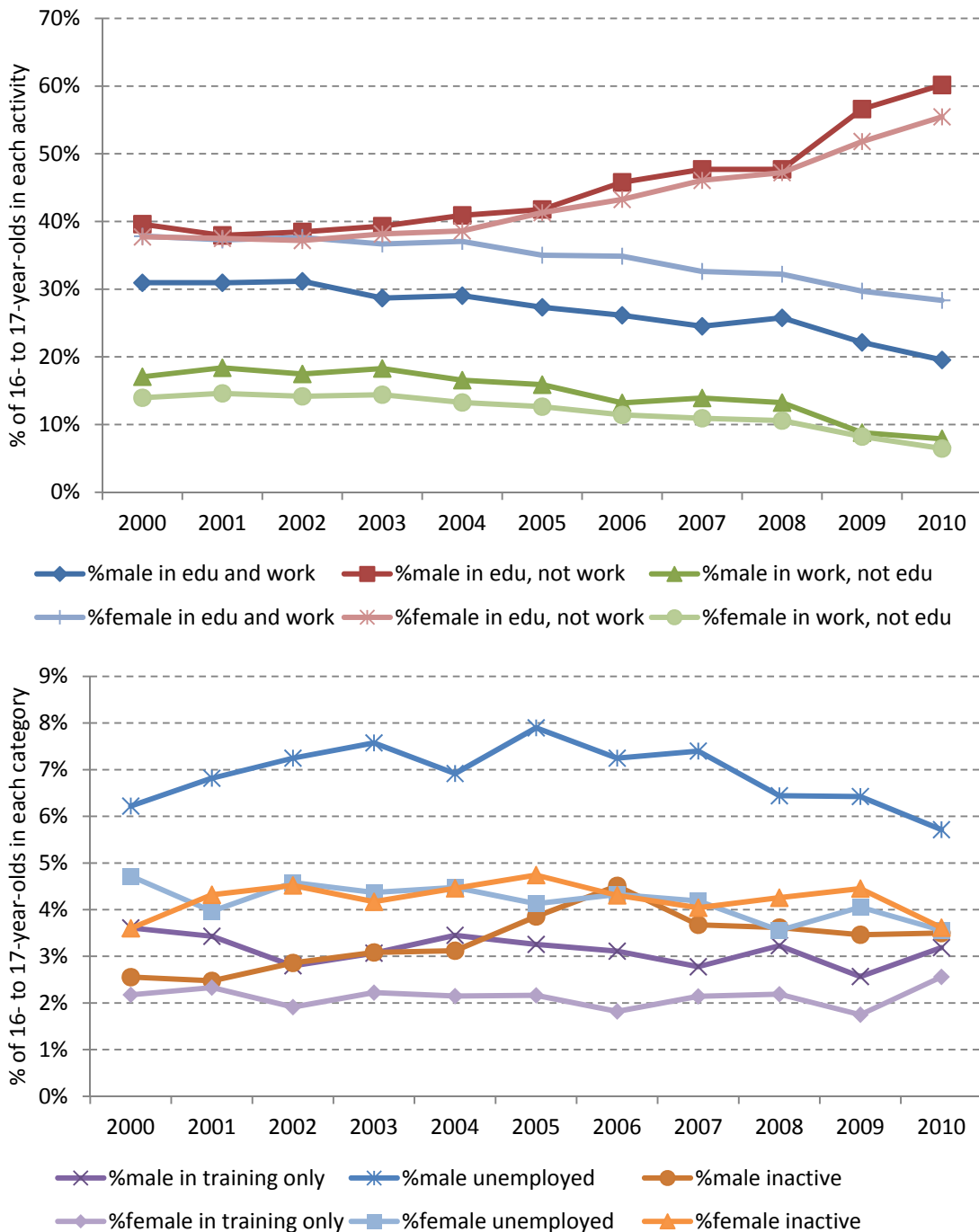
2.2 Trends in young people’s education and labour market choices by subgroup

In this section, we examine young people’s education and labour market choices by gender, ethnicity, highest educational qualification, parental earnings and region, to see whether the trends vary according to these background characteristics. As we are now splitting the sample into subgroups, we will focus on annualised data to ensure that there are a reasonable number of observations underlying each data point.

Gender

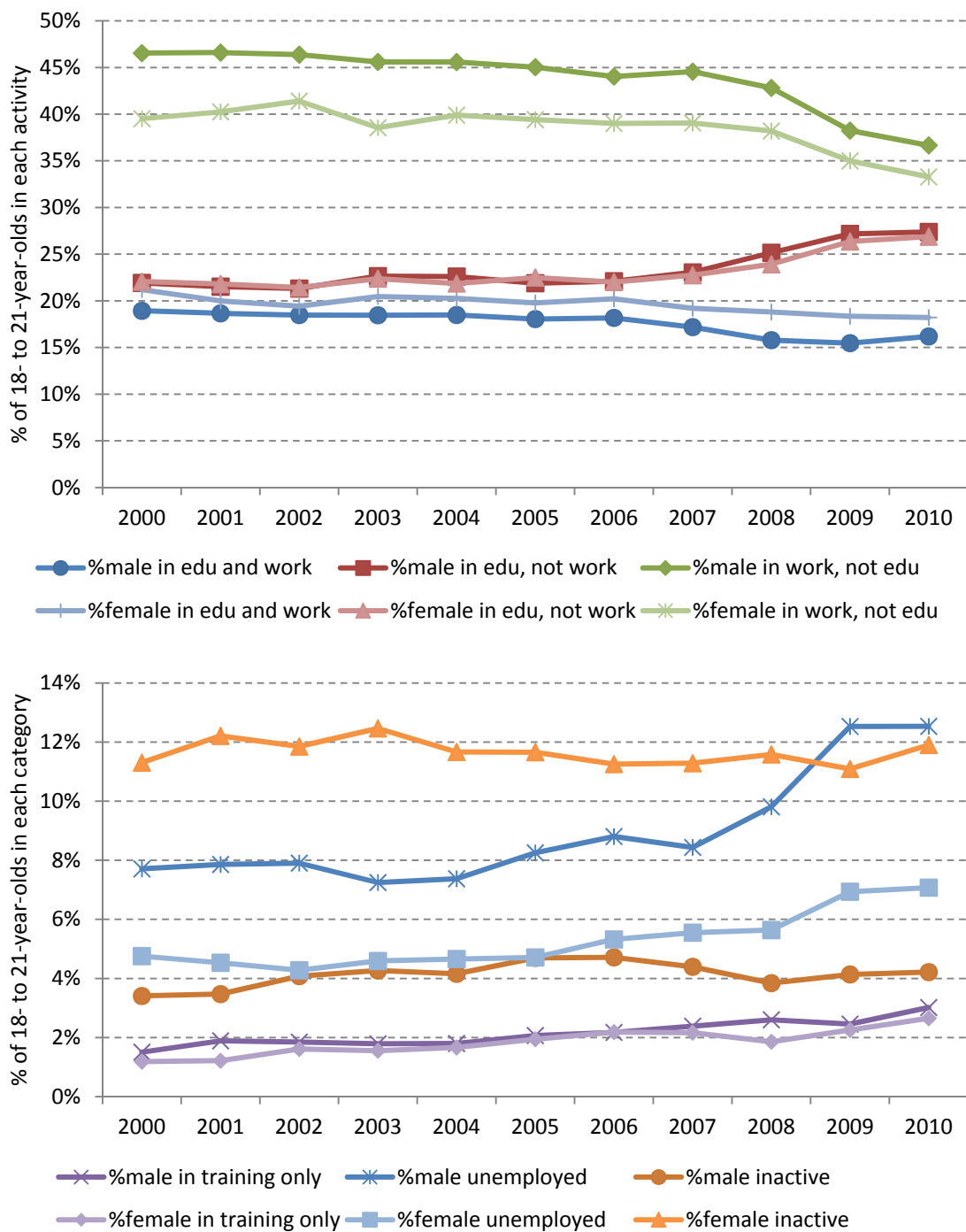
Figure 2.7 shows that there are large gender differences in the education and labour market choices of 16- to 17-year-olds. In particular, 16- to 17-year-old males are much less likely to combine education and work than their female counterparts; they are also much more likely to be unemployed. Since the recession, the proportion of boys in education only has risen faster than the proportion of girls in the same category, just as the proportion who are unemployed has fallen faster.

Figure 2.7 16- to 17-year-olds' activities by gender over time



Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010.

Figure 2.8 18- to 21-year-olds' activities by gender over time



Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010.

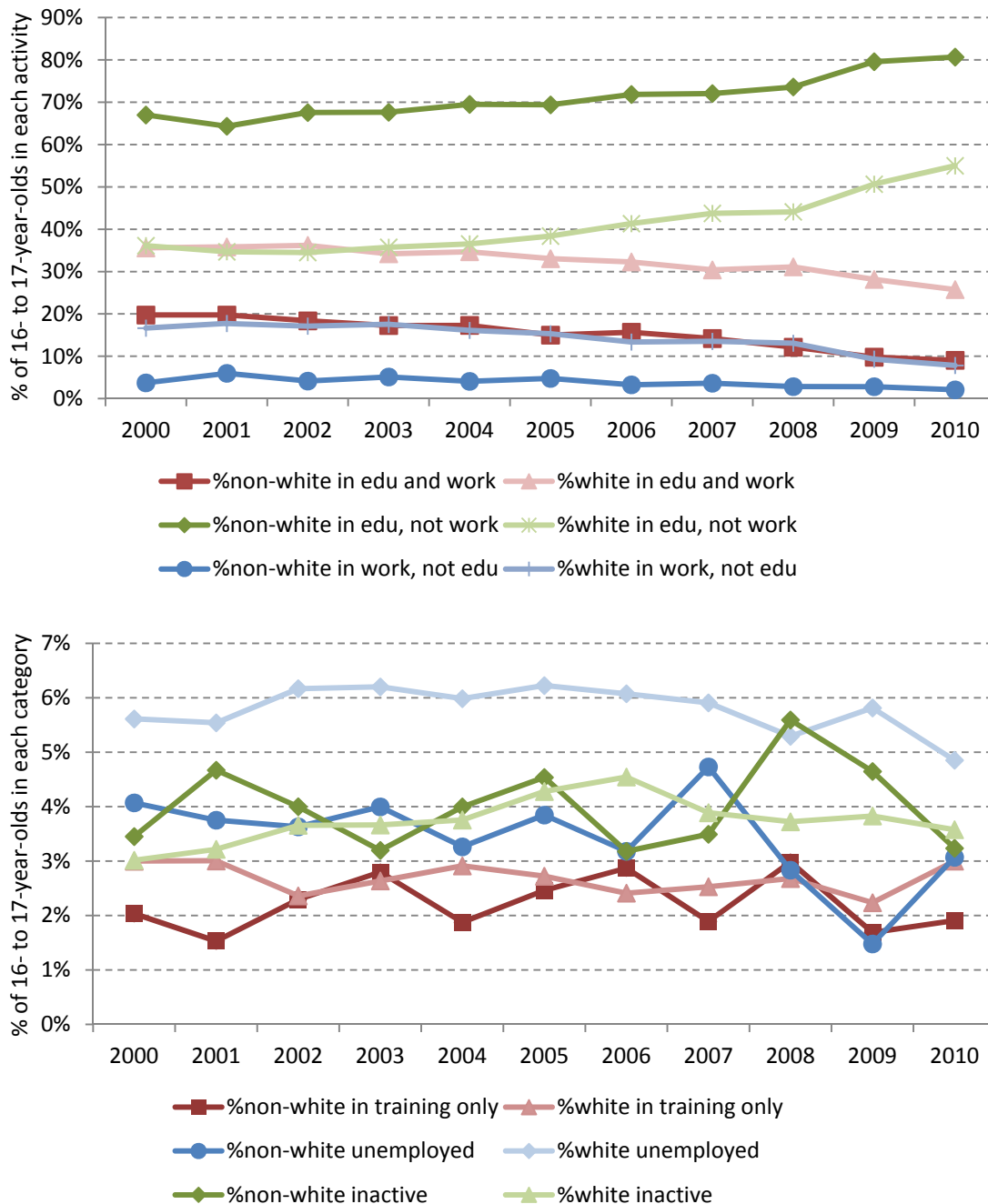
Figure 2.8 shows that similar gender differences exist among 18- to 21-year-olds. Compared with females, males in this age group are less likely to combine education and work, more likely to be in work alone but also more likely to be unemployed, and less likely to be inactive. Moreover, the proportion of young people who are unemployed has increased more amongst males than females since the recession.

Ethnicity

Figure 2.9 presents ethnic differences in young people's education and labour market choices. It shows that ethnic minorities are substantially more likely to be in education only than whites. Figure 2.10 splits

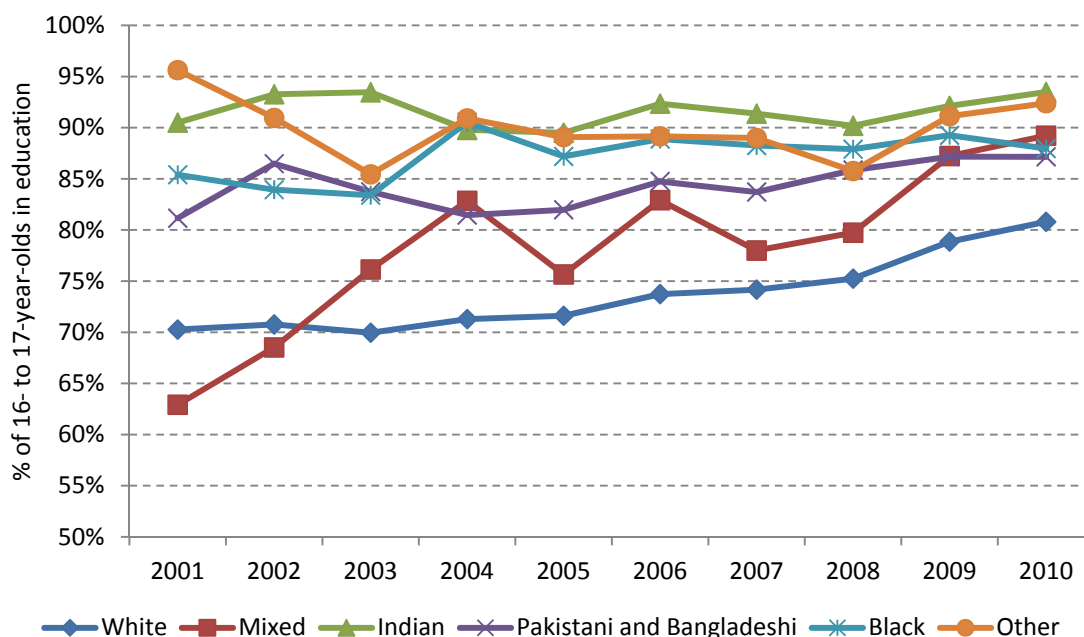
the non-white group down further and plots the proportion of each group in education, regardless of work status. It shows that each ethnic minority group has a higher proportion of young people in education than the white majority, with the difference ranging from 6 to 12 percentage points in 2010. Moreover, young people from white and most non-white backgrounds have increased their education participation rates significantly since 2008, and the inactivity rate has fallen substantially amongst non-white youths over the same period.

Figure 2.9 16- to 17-year-olds' activities by ethnicity over time



Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010. There are around 1,000 non-white 16- to 17-year-olds in the sample each year.

Figure 2.10 Percentage of 16- to 17-year-olds in education (regardless of work status) by ethnicity over time

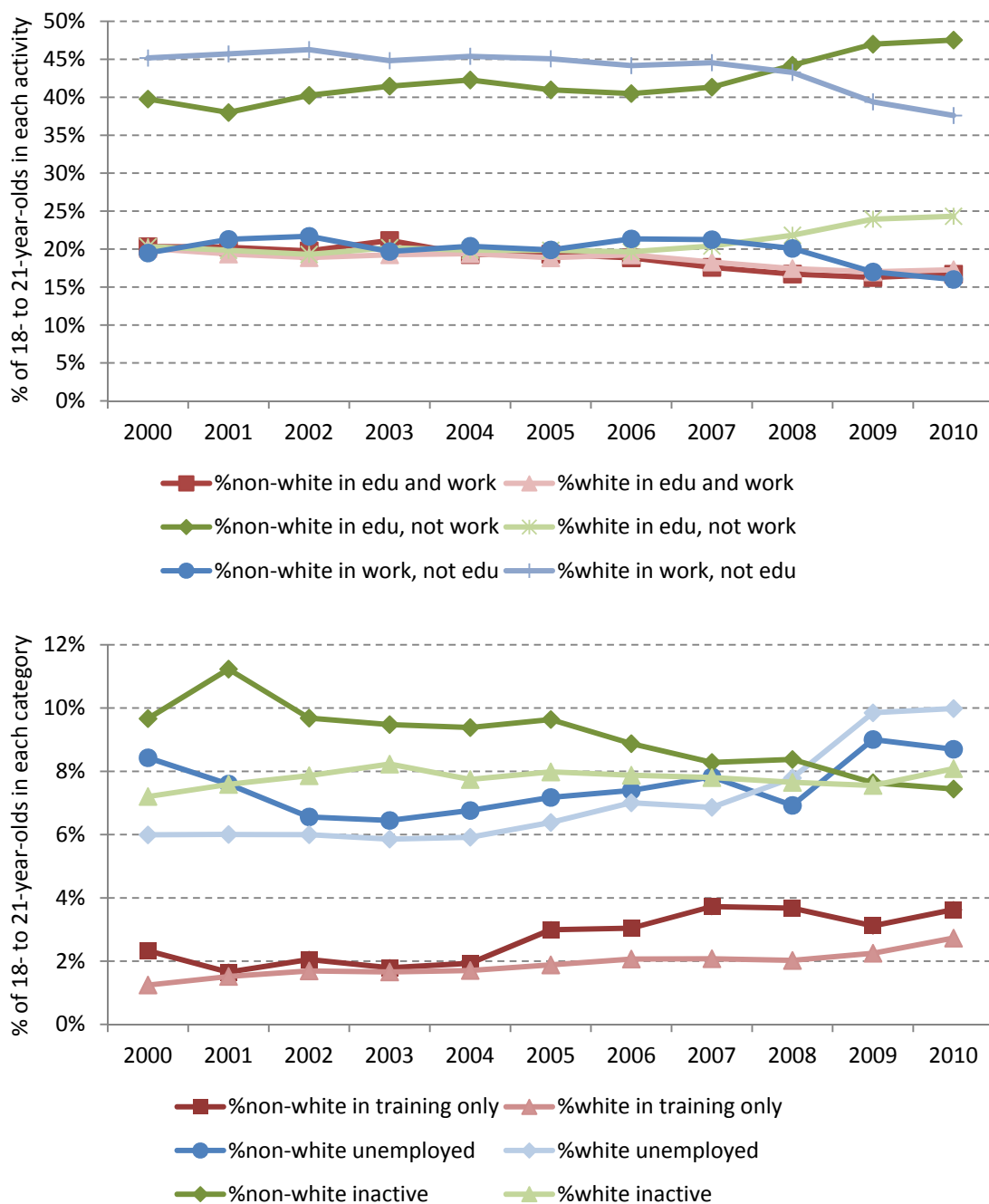


Notes: This analysis is based on data from the Labour Force Survey, 2001 to 2010. (More detailed ethnic breakdowns are not available in 2000.) The sample size for each non-white ethnicity ranges from approximately 150 to 350 individuals each year.

The differences between whites and ethnic minorities are even more striking at ages 18–21. Figure 2.11 shows that the most common status among white youths is to be in work and not in education, whereas the most common amongst ethnic minorities is to be in education and not in work. Until the recession, about 45% of white 18- to 21-year-olds were in work only, with about 20% in education only and 20% combining work and education. Among ethnic minorities, by contrast, about 40% were in education only, with 20% in work only and 20% combining the two, suggesting a gap in the education participation rate of about 20 percentage points between whites and ethnic minorities. Both white and non-white youths have seen a rise in education participation and a fall in employment over the long term, and there is no obvious difference between the participation trends of the two groups since the recession.

The lower panel of Figure 2.11 shows the differences in training, unemployment and inactivity status by ethnicity amongst 18- to 21-year-olds. Before 2008, white youths had always enjoyed lower unemployment proportions than ethnic minorities. Since 2008, however, this situation has been reversed. The bigger increase in unemployment among whites compared with non-whites is perhaps not surprising, given that a higher proportion of white than non-white youths were in work only. Meanwhile, the inactivity rate has changed little among white youths since the recession and has actually fallen slightly among ethnic minorities. Thus, white young people appear to have been hit harder by the recession than ethnic minorities – or have been able to respond less well to the change in circumstances – at least in terms of relative changes to unemployment and inactivity rates.

Figure 2.11 18- to 21-year-olds' activities by ethnicity over time



Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010. There are around 2,000 non-white 16- to 17-year-olds in the sample each year.

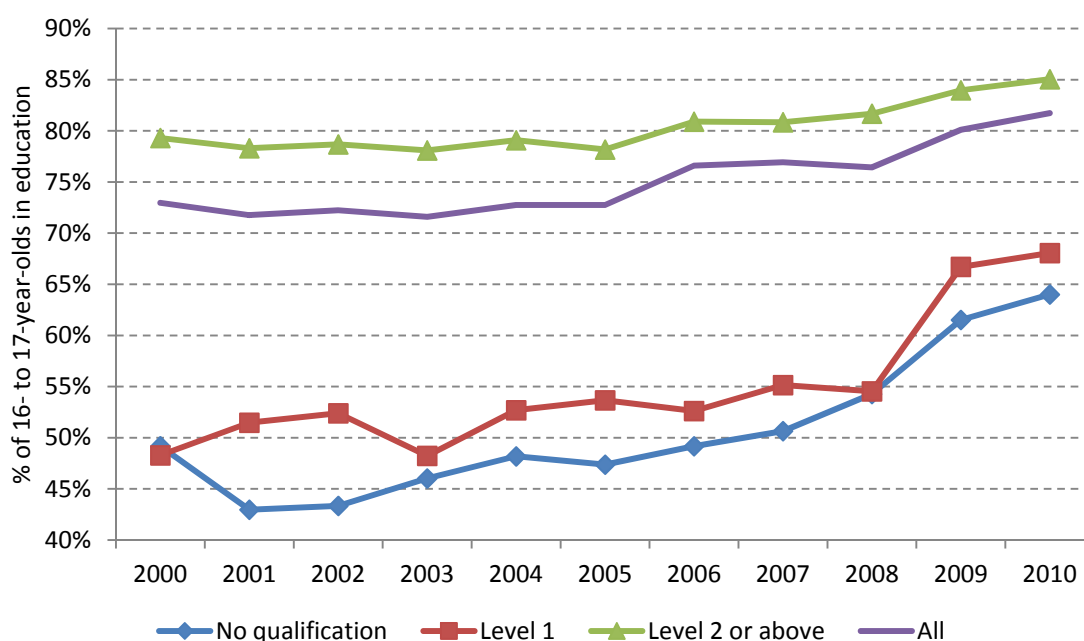
Highest qualification

We now move on to examine the trends in young people's education and labour market choices by their highest qualification level. As Level 2 (equivalent to five A*-C grades at GCSE) is the expected highest qualification level for 16- to 17-year-olds and Level 3 (equivalent to two A levels at grades A-E) is the expected highest qualification level for most 18- to 21-year-olds, we compare, in the following graphs,

education and labour market trends among three groups of 16- to 17-year-olds (Levels 0, 1 and '2 or above') and four groups of 18- to 21-year-olds (Levels 0, 1, 2 and '3 or above').¹³

We first look at the proportion of young people in education. Intuitively, young people with higher abilities, as reflected by higher qualifications, are more likely to stay in education. This is illustrated in Figure 2.12. There is a striking difference between the participation rates of 16- to 17-year-olds with and without Level 2 qualifications. Meanwhile, there is a slightly positive time trend in education participation in each of the three groups. Since the recession, this long-term positive trend has increased particularly rapidly for those without Level 2 qualifications. It is plausible that the recession reduced job opportunities more for those with lower academic abilities, so that an increasing number of them are now staying on in education to avoid the risk of becoming NEET.

Figure 2.12 Percentage of 16- to 17-year-olds in education (regardless of work status) by highest qualification over time

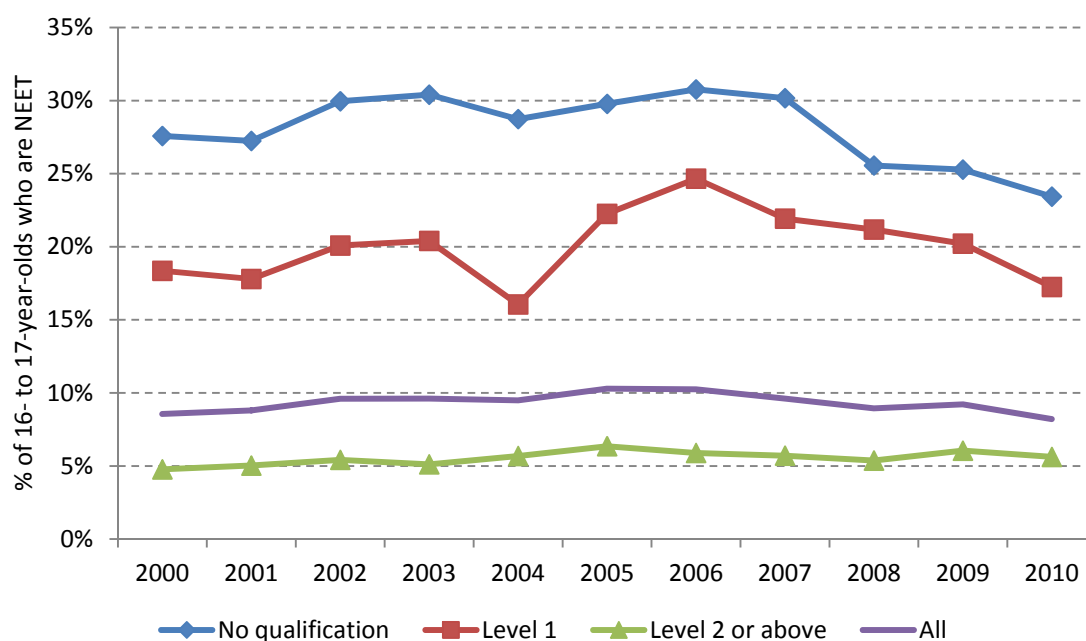


Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010.

As seen in Figure 2.13, the risk of being NEET is much higher for 16- to 17-year-olds with no qualifications than for those with Level 1 qualifications, which is in turn significantly higher than for those who have achieved at least Level 2 qualifications. Since the recession, there has been a marked decline in the proportion of young people who are NEET amongst the two less-qualified groups, although to a lesser extent than the overall rise in education participation amongst those groups. Nonetheless, it is interesting to note that the rise in education participation that we observe appears to be driven by changing decisions across a wide range of individuals with differing expectations of success in the labour market.

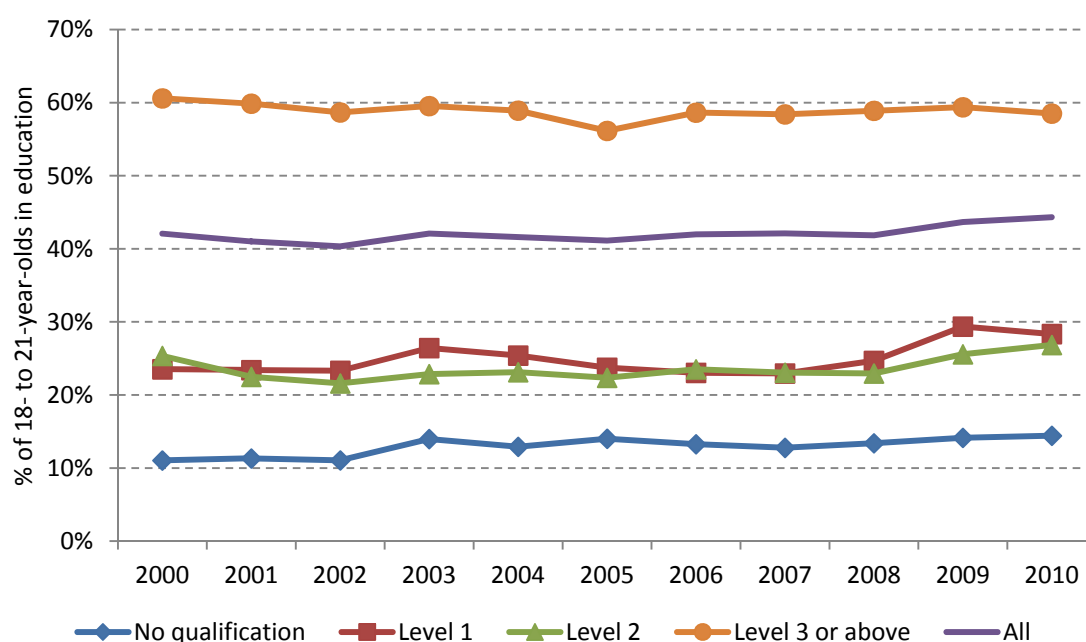
¹³ Level 0 refers to individuals with no qualifications. Level 1 refers to individuals with some recognised qualification, but at a level less than the equivalent of five GCSEs at grades A*–C. We drop the few individuals who appear to have obtained a Level 4 qualification (such as a first degree) by age 17 or a Level 5 qualification (equivalent to a Masters degree) by age 21.

Figure 2.13 Percentage of 16- to 17-year-olds who are NEET by highest qualification over time



Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010.

Figure 2.14 Percentage of 18- to 21-year-olds in education (regardless of work status) by highest qualification over time

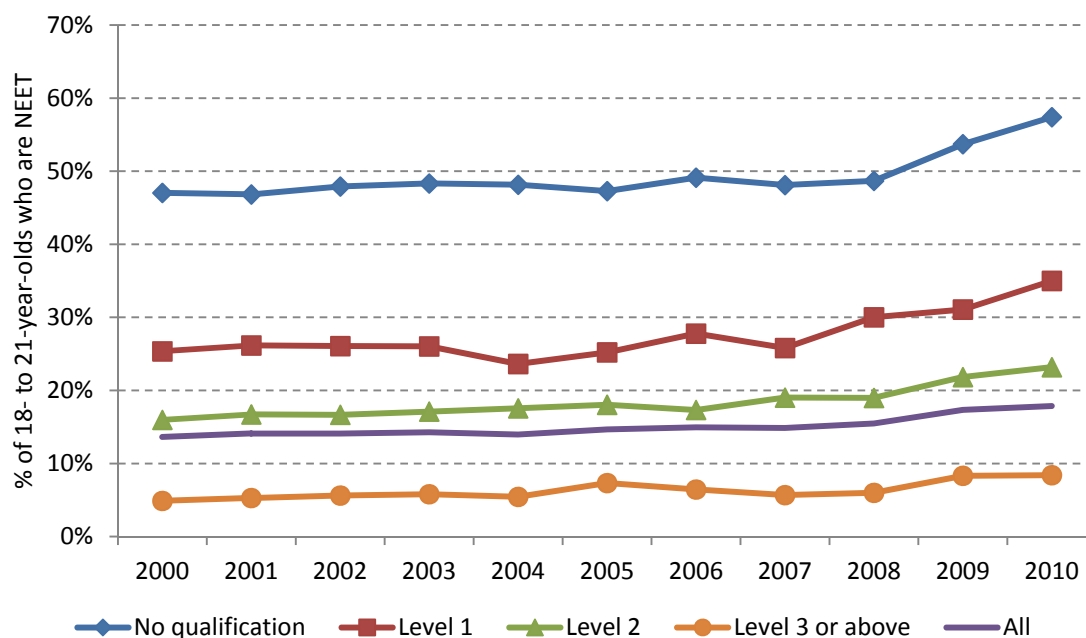


Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010.

For the 18–21 age group, young people with higher levels of qualifications are also more likely to be in education. Figure 2.14 shows that there has been an increase in education participation amongst those with Level 1 or 2 qualifications since the recession, while the participation rates of other groups have remained relatively flat. As observed for 16- to 17-year-olds, there is also a negative correlation between qualification level and the probability of being NEET among 18- to 21-year-olds. Figure 2.15 shows that about half of all 18- to 21-year-olds with no qualifications are NEET; by contrast, only around 10% of the

'Level 3 or above' group are NEET (partly because the majority of them are still in education). Since 2008, there has been an unambiguous increase in the proportion of young people who are NEET in each of the four groups. Moreover, the absolute magnitude of the increase is bigger for the less-qualified groups.

Figure 2.15 Percentage of 18- to 21-year-olds who are NEET by highest qualification over time



Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010.

Since the recession, the contrast between what has happened to the proportions of young people aged 16–17 and 18–21 who are NEET is interesting. Whereas some less-qualified 16- to 17-year-olds seem to have stayed on in education to avoid the possibility of becoming NEET, the same has not happened for 18- to 21-year-olds. One possible reason is the availability of financial support in the form of the Education Maintenance Allowance (EMA) for 16- to 17-year-olds – but not 18- to 21-year-olds – from families with relatively low income. (We investigate this possibility directly by considering differences in young people’s outcomes by parental earnings below.) Another, perhaps more fundamental, reason is that education opportunities are likely to be more readily available to low-qualified 16- to 17-year-olds than to low-qualified 18- to 21-year-olds, for whom the barriers to and costs of staying in education are likely to be greater.

Parental earnings

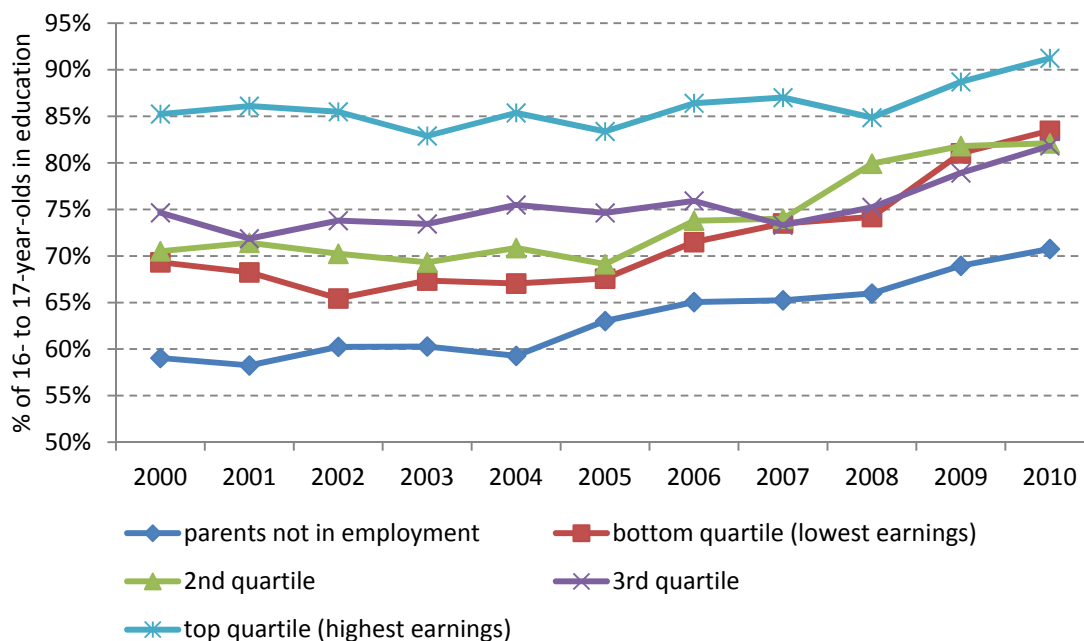
We now move on to consider trends in young people’s education and labour market choices by family income. In this analysis, we proxy family income using information on parental earnings from employment – averaged across each quarter for which it is available – as information on other sources of income is scarce. We are able to observe this measure for about 70–80% of the youth population.¹⁴ We split young people into five groups according to this measure: the first are families in which parents have zero earnings from employment (we refer to these as workless households); the other four are equally-sized groups (quartiles) split according to parental earnings.

Figure 2.16 shows the proportion of young people aged 16–17 in education according to these five groups of parental earnings. It shows that 16- to 17-year-olds in workless households are less likely to be in

¹⁴ Earnings questions are not asked of self-employed people in the LFS. Moreover, they are only asked in Waves 1 and 5, and responses are sometimes missing even if the individuals are in employment in these waves.

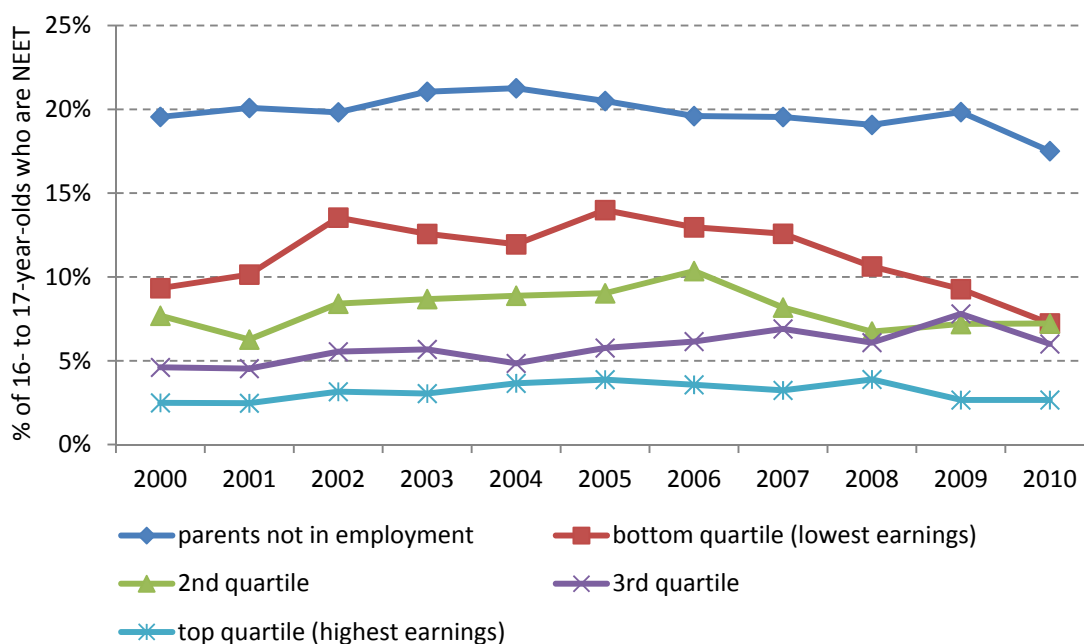
education than those whose parents have positive earnings, and that those whose parents have the highest earnings are more likely to remain in education than those whose parents have modest earnings. While all groups have experienced a long-term rise in education participation, it has grown particularly rapidly amongst children from workless families and those in the bottom half of the parental earnings distribution since 2004, coinciding with the introduction of the EMA and the 16- to 17-year-old rate of the minimum wage. Moreover, since the beginning of the recession (in 2008), the increase in education participation has sped up for 16- to 17-year-olds from all income backgrounds.

Figure 2.16 Percentage of 16- to 17-year-olds in education by parental earnings over time



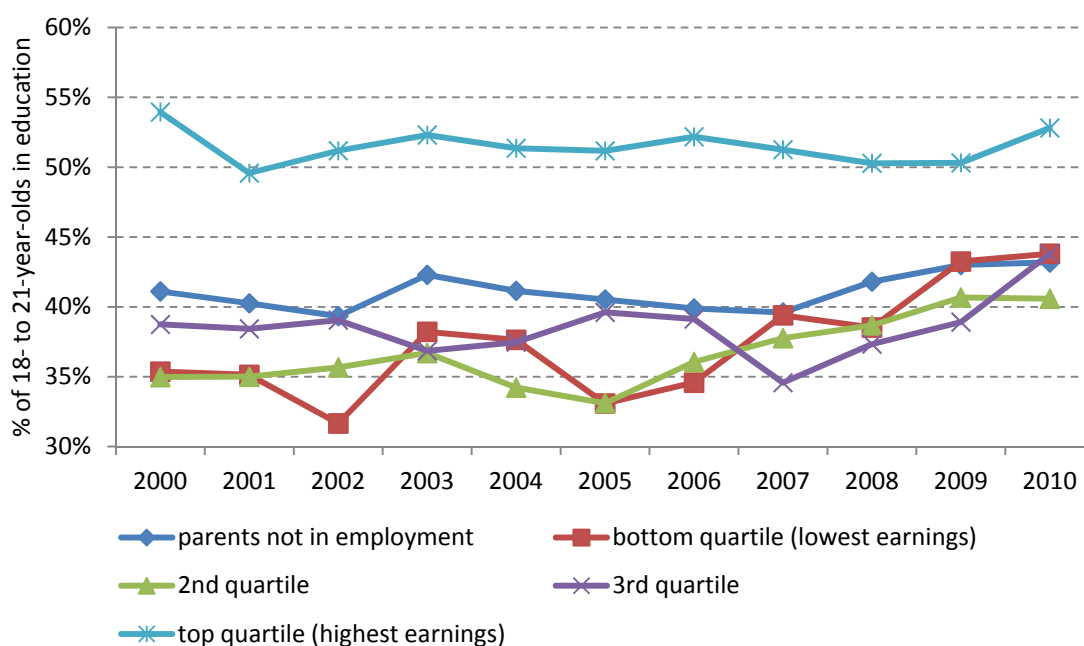
Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010.

Figure 2.17 Percentage of 16- to 17-year-olds who are NEET by parental earnings over time



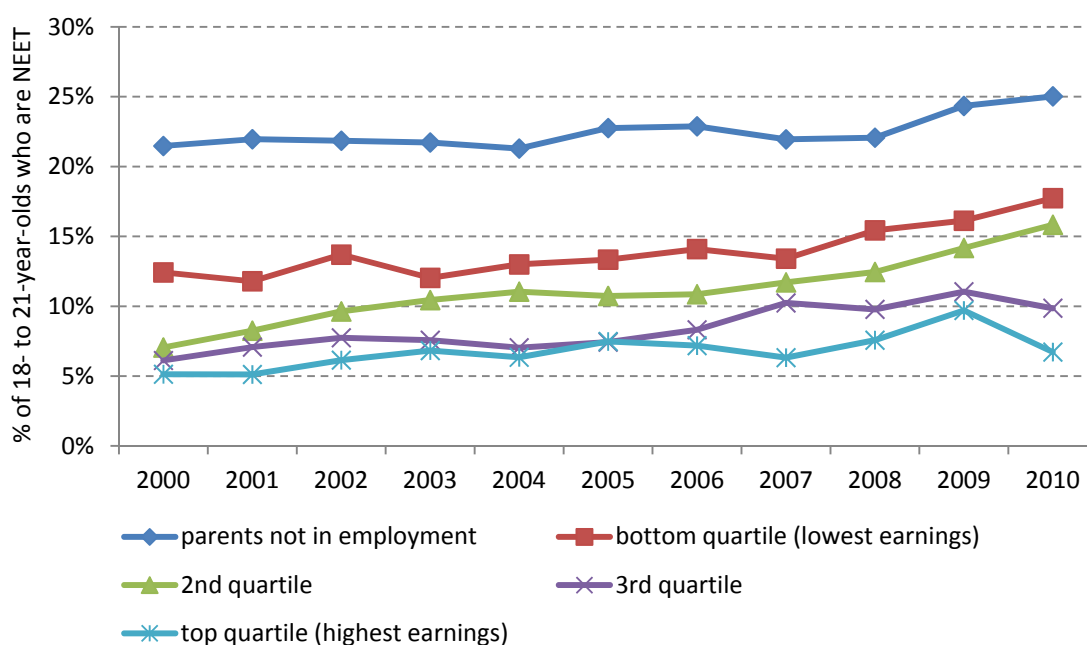
Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010.

Figure 2.18 Percentage of 18- to 21-year-olds in education by parental earnings over time



Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010.

Figure 2.19 Percentage of 18- to 21-year-olds who are NEET by parental earnings over time



Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010.

Figure 2.17 shows the percentage of 16- to 17-year-olds who are NEET, split according to the same five groups of parental earnings. Perhaps unsurprisingly, young people from poorer families have a higher risk of becoming NEET, with the difference particularly large between those from workless and working families. Interestingly, since the recession, the fastest fall in the percentage of 16- to 17-year-olds who are NEET is for those in the bottom quartile of the earnings distribution. This echoes the fall among less-qualified young people discussed above. Thus, it appears that the recession not only pushed 16- to 17-

year-olds from employment into education, but also increased education participation amongst those at greatest risk of becoming NEET (i.e. the less-educated and the poor).

Figures 2.18 and 2.19 present similar estimates of the proportions of 18- to 21-year-olds in education or who are NEET, respectively, by parental earnings. As for 16- to 17-year-olds, we observe significant socio-economic gaps in both outcomes, with young people from the highest-earning families substantially more likely to be in education than young people from other backgrounds, and those from workless households substantially more likely to be NEET than other groups. There has also been an increase in education participation since the start of the recession for all groups. However, unlike 16- to 17-year-olds, the percentage of 18- to 21-year-olds who are NEET has increased since 2008, particularly amongst those from the lowest-earning families and those with parents not in employment, mirroring the findings by highest qualification described above.

Region

Lastly, we examine how the trends in young people's education and labour market choices vary by region. Tables 2.1 to 2.4 reveal substantial differences in both the levels and trends in education and labour market outcomes for 16- to 17- and 18- to 21-year-olds.

Table 2.1 shows the proportion of 16- to 17-year-olds in education by government office region in England for each year from 2000 to 2010. Some regions (such as London) had much higher 16-17 participation rates than other regions (such as the North East and West Midlands) in most years. While all regions saw an increase in participation rates over the last decade, it is the ones that started from the lowest bases that have seen the biggest increases. Moreover, these increases seem to have occurred particularly rapidly in some areas (such as the East and the West Midlands) since the recession.

Table 2.1 Percentage of 16- to 17-year-olds in education by region in England over time

	North East	North West	Yorkshire and the Humber	East Midlands	West Midlands	East	London	South East	South West
2000	63%	71%	68%	70%	69%	71%	80%	73%	79%
2001	63%	71%	66%	71%	72%	74%	79%	73%	76%
2002	65%	70%	69%	75%	70%	73%	80%	73%	76%
2003	67%	70%	68%	71%	66%	70%	77%	73%	78%
2004	70%	73%	71%	71%	70%	75%	79%	76%	75%
2005	66%	73%	69%	73%	73%	76%	79%	75%	75%
2006	73%	73%	71%	75%	75%	76%	79%	81%	77%
2007	77%	77%	75%	72%	72%	75%	84%	78%	76%
2008	72%	75%	75%	76%	76%	75%	85%	80%	77%
2009	71%	78%	79%	79%	80%	82%	89%	81%	83%
2010	77%	78%	81%	82%	83%	82%	86%	84%	85%

Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010. Each figure is based on at least 400 16- to 17-year-olds per region.

Table 2.2 presents similar figures for 18- to 21-year-olds. It shows that London had the highest education participation rates amongst this age group throughout the period, with the North East catching up quickly with most of the country from a very low starting point.

Tables 2.3 and 2.4 present NEET rates among 16- to 17-year-olds and 18- to 21-year-olds respectively, by region. The North East has amongst the highest NEET rates for both age groups, while the South East has amongst the lowest. Whilst NEET rates amongst 16- to 17-year-olds have mostly fallen over the past

Table 2.2 Percentage of 18- to 21-year-olds in education by region in England over time

	North East	North West	Yorkshire and the Humber	East Midlands	West Midlands	East	London	South East	South West
2000	37%	44%	40%	40%	40%	36%	49%	43%	41%
2001	36%	40%	42%	40%	39%	32%	51%	42%	41%
2002	37%	38%	39%	38%	39%	32%	49%	40%	40%
2003	41%	38%	42%	40%	42%	35%	51%	41%	41%
2004	36%	39%	46%	38%	39%	35%	50%	42%	44%
2005	34%	41%	43%	40%	41%	35%	51%	41%	43%
2006	42%	40%	42%	40%	43%	33%	47%	40%	43%
2007	42%	39%	43%	35%	40%	36%	50%	42%	41%
2008	43%	40%	45%	38%	42%	35%	52%	39%	40%
2009	43%	40%	45%	43%	43%	35%	57%	41%	43%
2010	45%	44%	41%	44%	40%	37%	56%	47%	43%

Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010. Each figure is based on at least 780 18- to 21-year-olds per region.

Table 2.3 NEET rates among 16- to 17-year-olds by region in England over time

	North East	North West	Yorkshire and the Humber	East Midlands	West Midlands	East	London	South East	South West
2000	16%	10%	10%	7%	12%	8%	9%	6%	4%
2001	13%	10%	11%	8%	9%	7%	9%	6%	5%
2002	14%	12%	12%	7%	11%	8%	9%	8%	6%
2003	11%	11%	12%	8%	13%	8%	11%	8%	6%
2004	11%	10%	11%	10%	10%	7%	10%	7%	7%
2005	15%	11%	13%	10%	9%	8%	12%	8%	7%
2006	13%	11%	11%	12%	11%	10%	10%	7%	7%
2007	9%	9%	12%	12%	12%	9%	8%	9%	8%
2008	10%	9%	11%	8%	11%	8%	8%	8%	7%
2009	13%	11%	12%	9%	10%	8%	5%	9%	7%
2010	9%	10%	9%	8%	8%	7%	8%	6%	6%

Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010. Each figure is based on at least 400 16- to 17-year-olds per region.

Table 2.4 NEET rates among 18- to 21-year-olds by region in England over time

	North East	North West	Yorkshire and the Humber	East Midlands	West Midlands	East	London	South East	South West
2000	20%	13%	17%	14%	15%	11%	15%	9%	9%
2001	17%	18%	16%	12%	16%	13%	14%	9%	12%
2002	18%	15%	16%	14%	15%	13%	14%	11%	11%
2003	20%	15%	14%	14%	15%	13%	16%	12%	11%
2004	19%	15%	13%	13%	17%	11%	18%	10%	10%
2005	19%	15%	14%	13%	15%	13%	17%	12%	12%
2006	17%	16%	17%	14%	16%	14%	19%	13%	14%
2007	16%	18%	15%	13%	19%	14%	17%	13%	12%
2008	19%	19%	16%	15%	17%	17%	16%	13%	11%
2009	22%	21%	18%	15%	21%	16%	15%	15%	16%
2010	21%	18%	20%	14%	21%	17%	17%	14%	17%

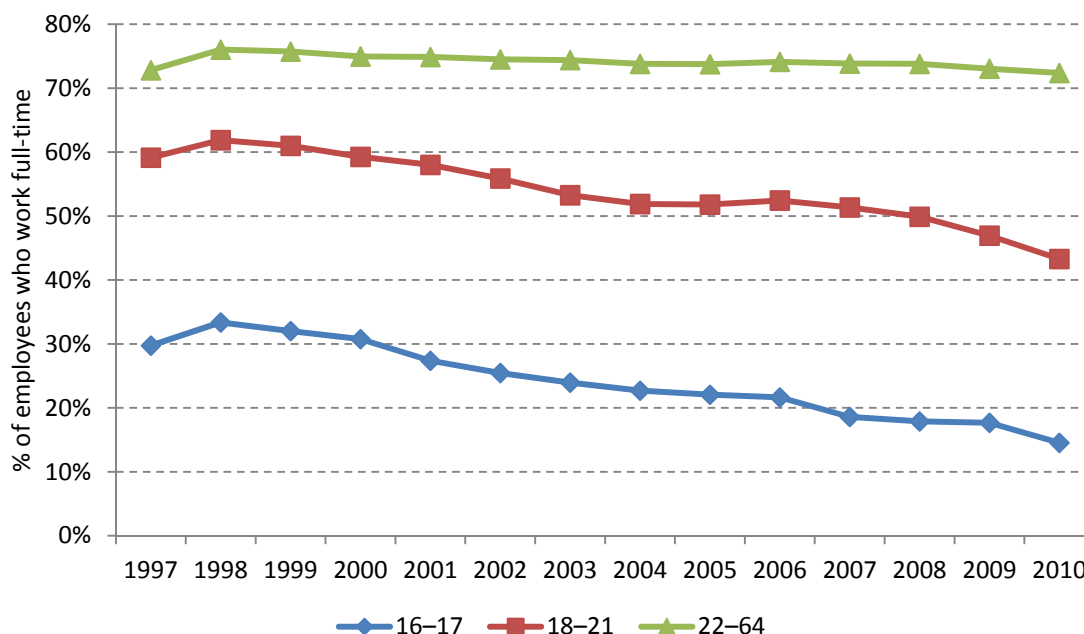
Notes: This analysis is based on data from the Labour Force Survey, 2000 to 2010. Each figure is based on at least 780 18- to 21-year-olds per region.

decade, all regions saw a rise in NEET rates amongst 18- to 21-year-olds over the same period, despite the general increase in education participation amongst this age group.¹⁵

2.3 Trends in wages and hours worked by employees

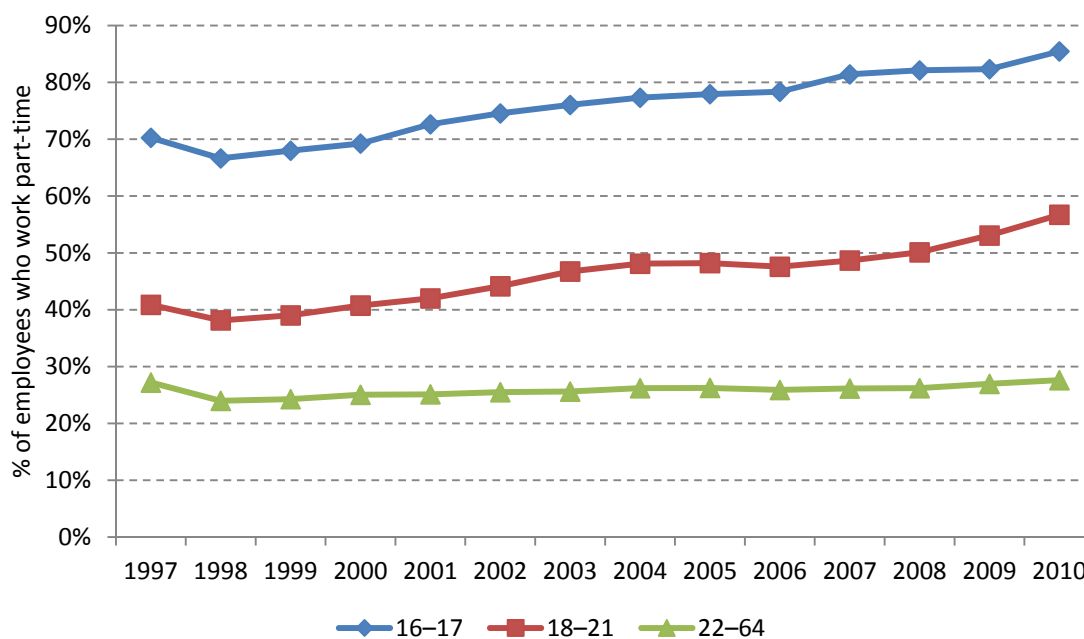
This section uses data from the Annual Survey of Hours and Earnings (ASHE) to explore how hours and earnings have changed over time amongst employees of different ages. Figure 2.20 shows how the

Figure 2.20 Percentage of employees who work full-time by age group over time



Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010.

Figure 2.21 Percentage of employees who work part-time by age group over time

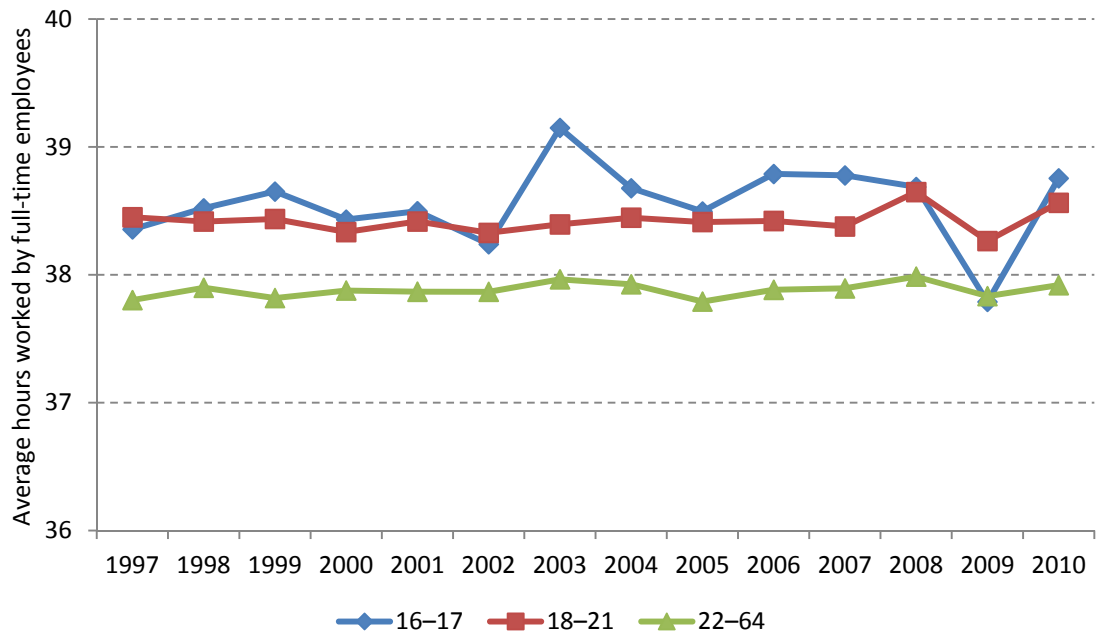


Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010.

¹⁵ East Midlands, for which the rounded figures suggest no change, saw an increase of about 0.8 percentage points.

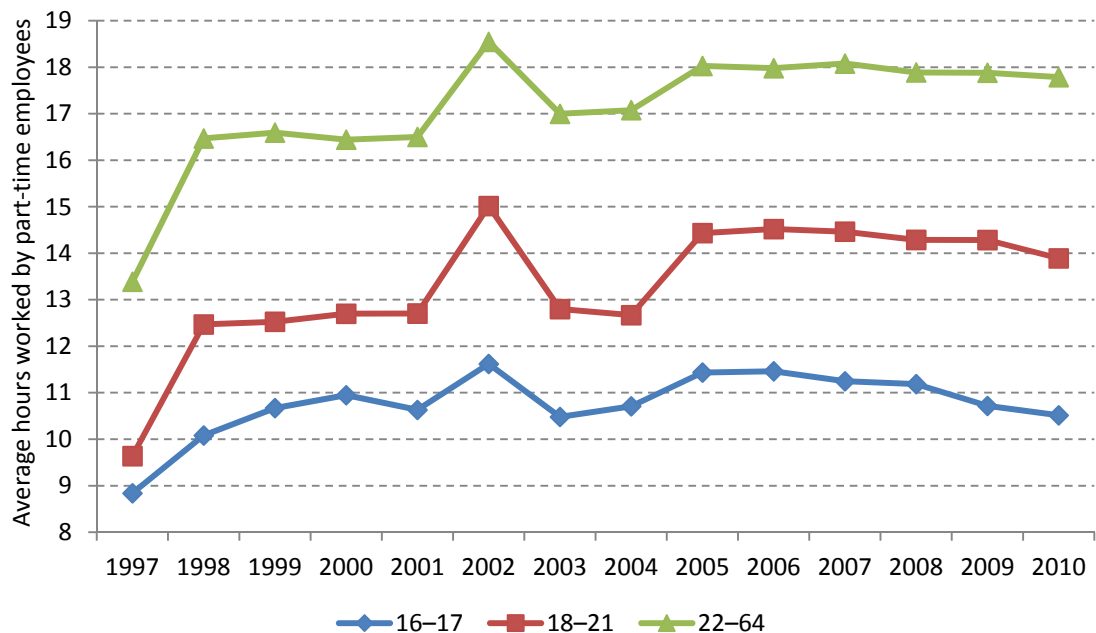
proportions of 16- to 17-, 18- to 21- and 22- to 64-year-old employees working full-time – classified as working more than 30 hours per week – have changed since 1997, while Figure 2.21 shows the proportions working part-time, which is simply the inverse of Figure 2.20.

Figure 2.22 Average weekly hours worked by full-time employees by age group over time



Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010. It excludes implausible outliers who report working more than 140 hours per week.

Figure 2.23 Average weekly hours worked by part-time employees by age group over time



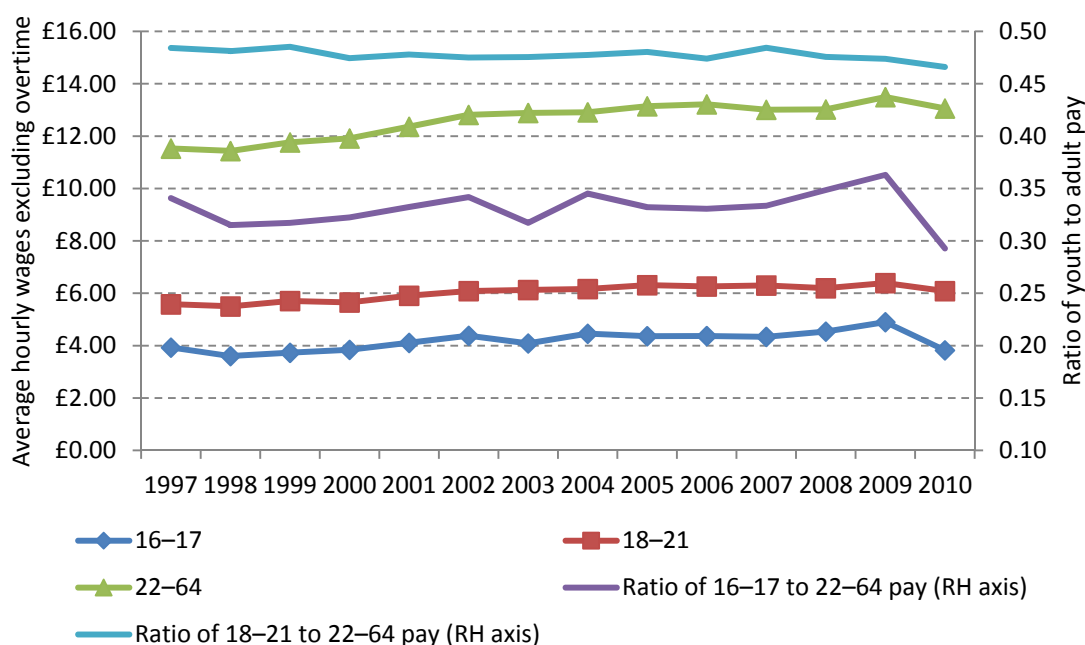
Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010.

It is clear that while there has been relatively little change amongst those aged 22–64, the proportion of young people who work full-time rather than part-time has decreased substantially over the last 13 years. For those aged 18–21, it has fallen from a peak of just over 60% in 1998 to just over 40% in 2010, a decrease of just under 20 percentage points. For those aged 16–17, it has more than halved, from 33% in 1998 to just 15% in 2010. This trend did not change markedly over the period of the recession.

Figures 2.22 and 2.23 show how the average number of hours worked has changed over time, separately for those in full-time and part-time work respectively. (Note that the scales on these graphs are very different, reflecting the large difference in average number of hours worked between full-time and part-time workers.) Figure 2.22 suggests that 16- to 17- and 18- to 21-year-olds work a higher number of hours on average than those aged 22–64 (although these differences are relatively small). By contrast, this pattern is reversed for part-time employees (shown in Figure 2.23). It is also clear from Figure 2.22 that there was a small decrease in the average number of hours worked by full-time employees between 2008 and 2009, coinciding with the recession. This effect was greatest for those aged 16–17 and 18–21, and less discernible for those aged 22–64. By contrast, Figure 2.23 shows that there was little change in average hours worked amongst part-time employees over the course of the recession.

Figures 2.24 and 2.25 present average hourly pay excluding overtime (in 2004 prices¹⁶), by age, separately for those in full- and part-time work respectively; the lines without data points marked, plotted on the right-hand axis, show how the relationship between youth (16–17 and 18–21) and adult (22–64) pay has changed over time. Figures 2.26 and 2.27 repeat the same analysis using median hourly pay. Perhaps unsurprisingly, these figures show a monotonic relationship between age and wages, with employees aged 16–17 earning less – both on average and at the median – than those aged 18–21, who in turn earn less than those aged 22–64. These differences are somewhat larger for full-time than part-time employees.

Figure 2.24 Average hourly pay excluding overtime for full-time employees by age group over time

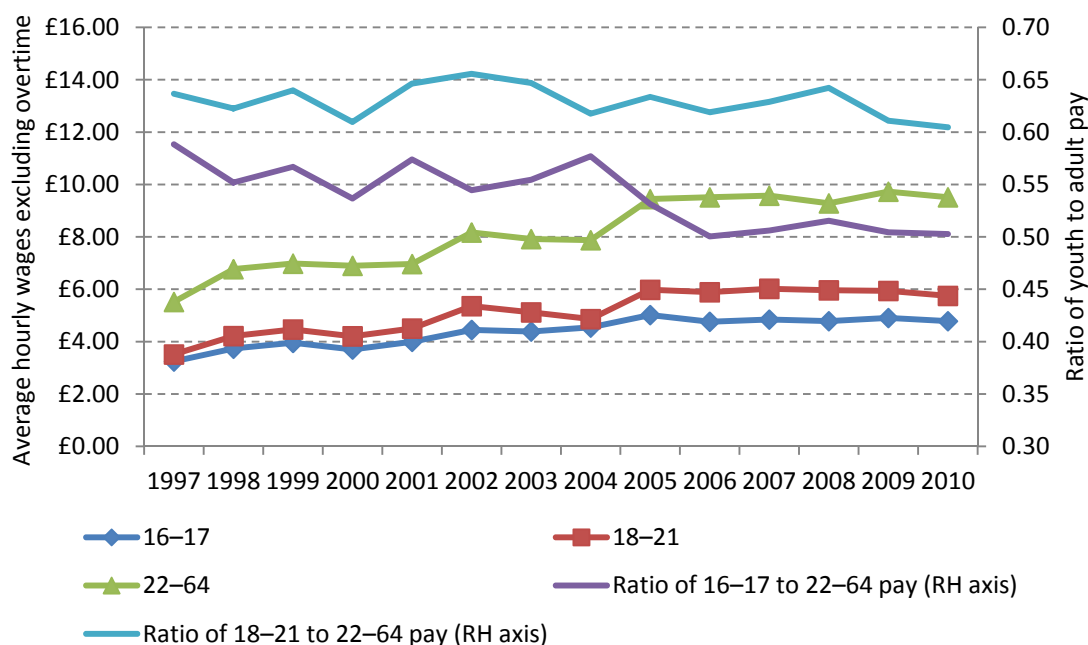


Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010, using 2004 prices. It excludes observations with hourly wages higher than £200.

¹⁶ We use 2004 prices because that is the point at which the 16- to 17-year-old rate of the national minimum wage (NMW) was introduced.

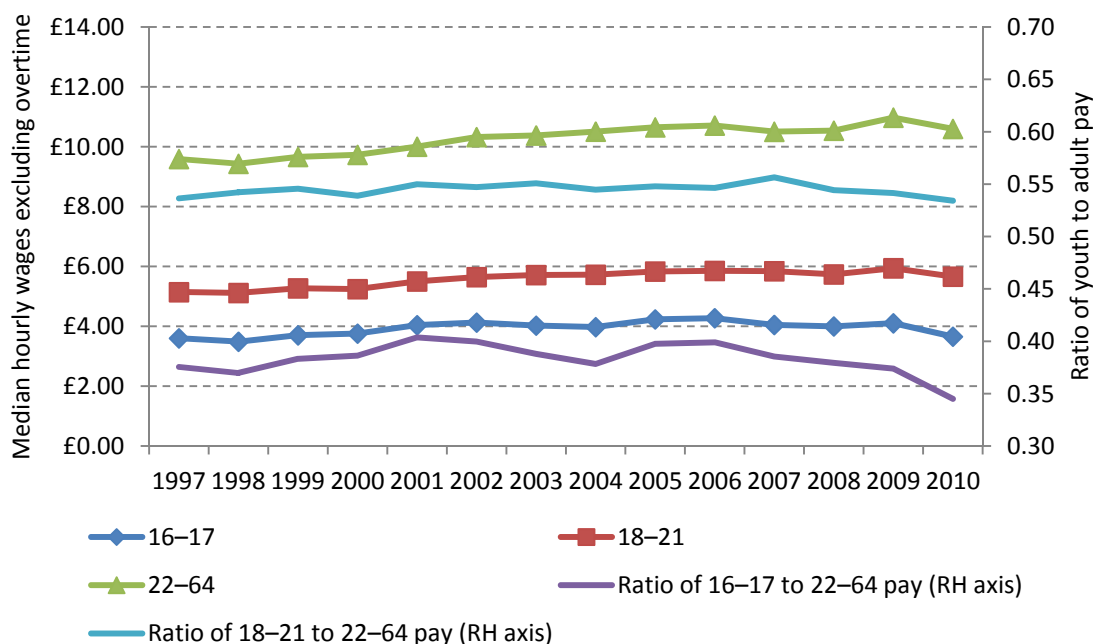
In general, both average and median wages for full-time employees have increased only slightly over this period, although there is evidence of a reduction in average pay for all age groups between 2009 and 2010, with a sharp fall in the ratio between 16- to 17-year-olds' and adults' wages confirming that this reduction was largest for the youngest workers.

Figure 2.25 Average hourly pay excluding overtime for part-time employees by age group over time



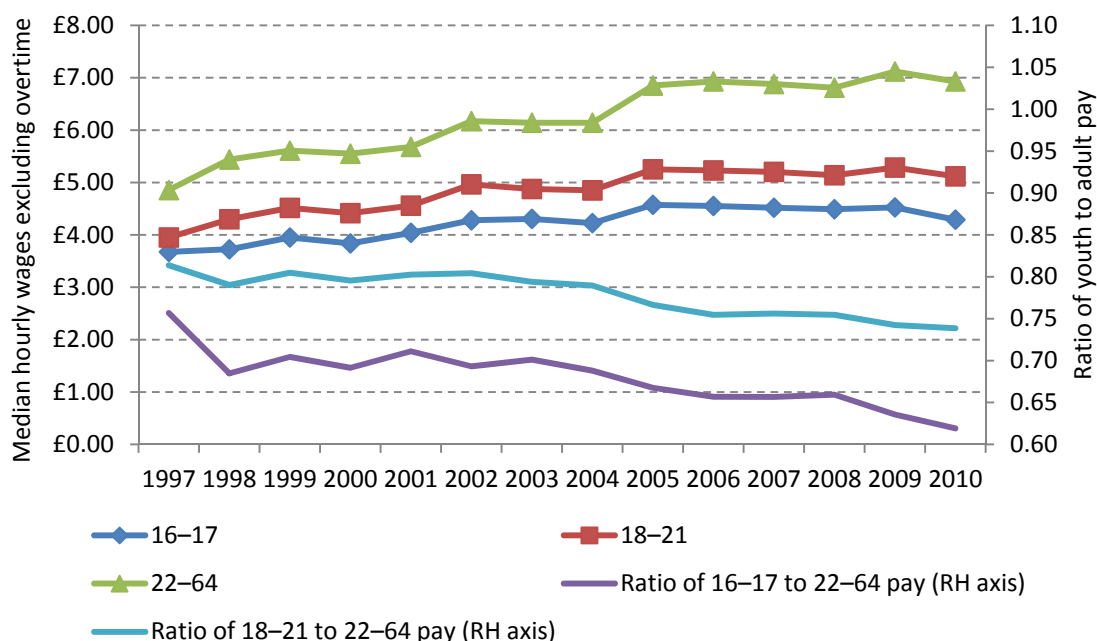
Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010, using 2004 prices. It excludes observations with hourly wages higher than £200.

Figure 2.26 Median hourly pay excluding overtime for full-time employees by age group over time



Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010, using 2004 prices. It excludes observations with hourly wages higher than £200.

Figure 2.27 Median hourly pay excluding overtime for part-time employees by age group over time



Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010, using 2004 prices. It excludes observations with hourly wages higher than £200.

By contrast, average and median hourly wages amongst part-time employees have increased markedly over the period, with average pay not exhibiting such a marked downturn during the recession as for full-time employees. These increases have been largest for adults, as evidenced by the continual fall in the relationship between youth (especially 16- to 17-year-olds) and adult wages over time. It is also worth noting that the ratio of youth to adult wages is much higher for part-time workers (50–60% for 16- to 17-year-olds and 60–65% for 18- to 21-year-olds) than for full-time workers (around 30–35% for 16- to 17-year-olds and 45–50% for 18- to 21-year-olds), and slightly higher for median than for average wages.

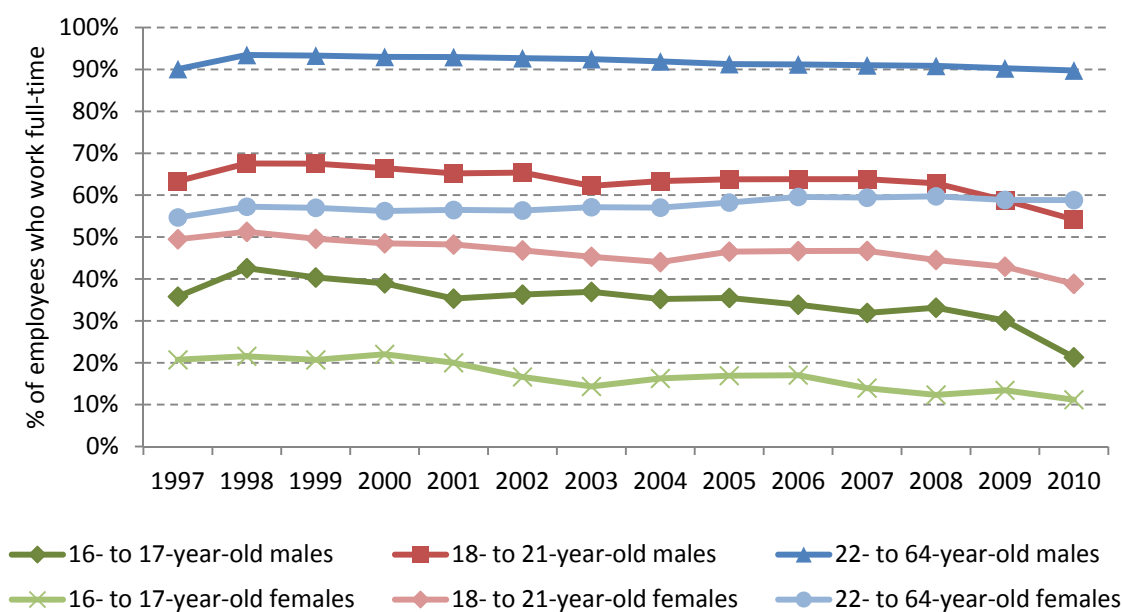
2.4 Trends in wages and hours worked, by subgroup

In this section, we examine whether these trends in wages and hours worked vary by gender or region. Again, this analysis is based on data from the Annual Survey of Hours and Earnings.

Gender

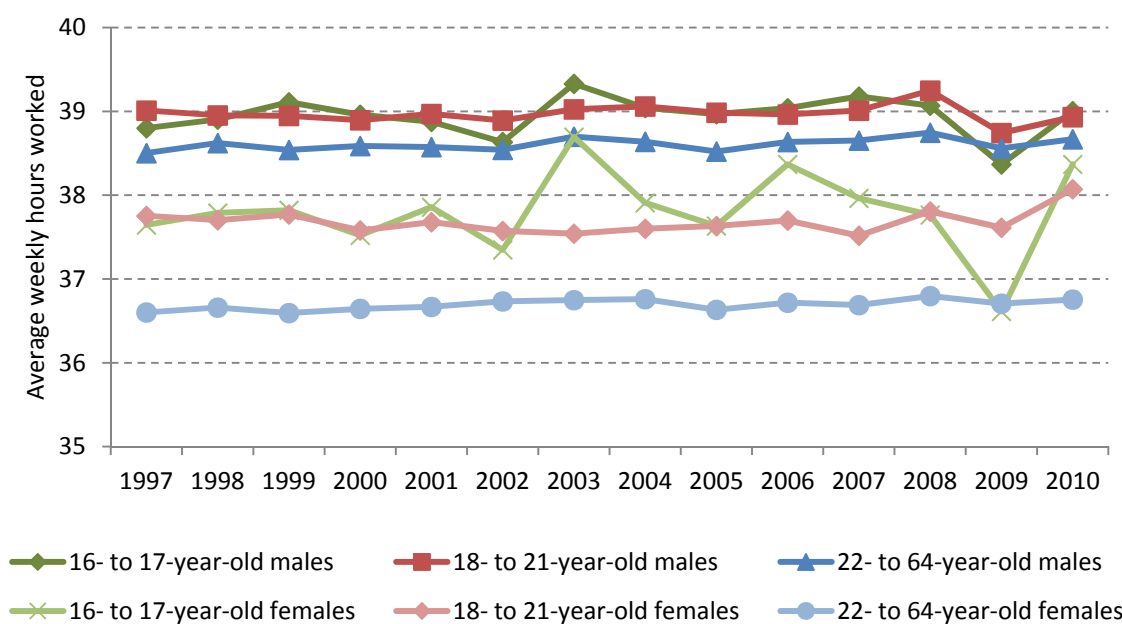
Figure 2.28 shows the proportion of employees in full-time work by gender for 16- to 17-, 18- to 21- and 22- to 64-year-olds. It is clear that females are much less likely to work full-time than males within each age group. Whereas about 90% of men aged 22–64 work full-time, less than 60% of women do. Among 18- to 21-year-olds, the proportions of males and females working full-time have declined slightly over the last few years, although at roughly the same rate, with the proportion of female full-timers 15–20 percentage points lower than the proportion of male full-timers every year. Similarly, the proportion of 16- to 17-year-old female full-timers has always been significantly lower than the male proportion, and both have fallen substantially in the past 13 years. For young males aged under 21, the recent recession seems to have sped up the declining trend of full-time work.

Figure 2.28 Percentage of employees who work full-time by gender and age group over time



Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010.

Figure 2.29 Average weekly hours worked by full-time employees by gender and age group over time

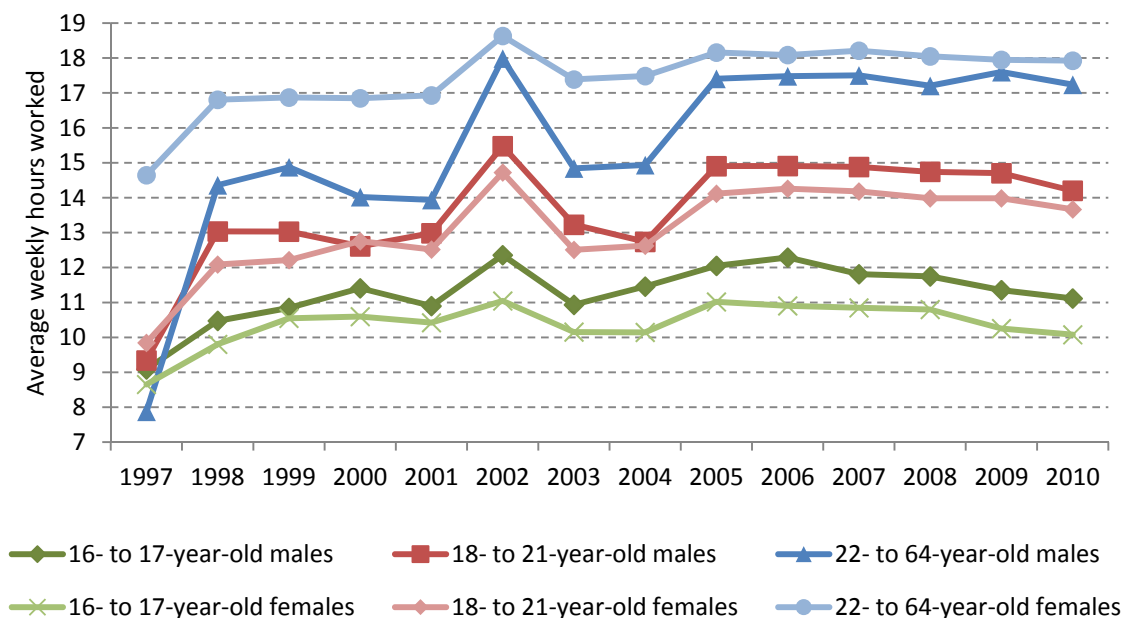


Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010. It excludes implausible outliers who report working more than 140 hours per week. The sample size for 16- to 17-year-old female full-time workers is in the range of 100–200 per year.

In terms of hours worked per week among full-time employees, we again see a substantial difference between males and females in each age group. Figure 2.29 shows that full-time adult females work, on average, 2 hours less per week than their male counterparts, a difference which has remained remarkably similar since 1997. For part-time employees (shown in Figure 2.30), the gender gap amongst adult

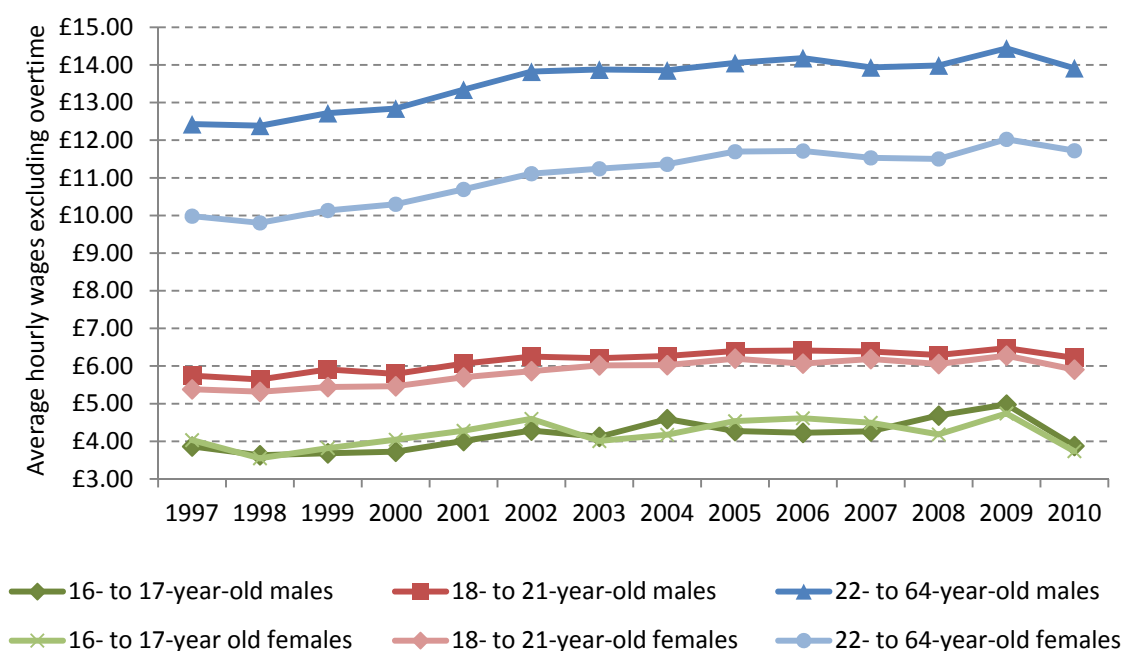
workers is somewhat smaller than for full-time employees by the end of the period, although it varied markedly up until 2005. The gender difference in average working hours is somewhat smaller for young people than for adults in full-time employment, while it is approximately similar amongst part-time workers.

Figure 2.30 Average weekly hours worked by part-time employees by gender and age group over time



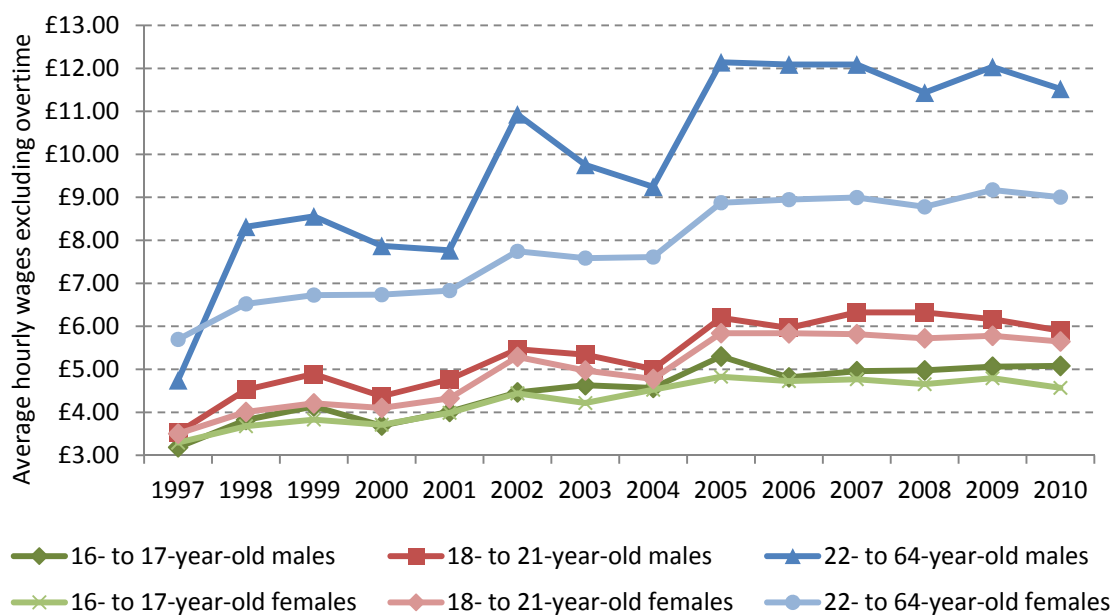
Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010.

Figure 2.31 Average hourly pay excluding overtime amongst full-time employees by gender and age group over time



Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010, using 2004 prices. It excludes observations with hourly wages higher than £200.

Figure 2.32 Average hourly pay excluding overtime amongst part-time employees by gender and age group over time



Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010, using 2004 prices. It excludes observations with hourly wages higher than £200.

Figures 2.31 and 2.32 present average hourly pay by gender and age group over the past 13 years, for full-time and part-time employees respectively. Both figures reveal a substantial pay gap between adult men and women. However, there are almost no gender differences in pay between 16- to 17-year-olds or 18- to 21-year-olds for either full-time or part-time employees.

Region

Due to the relatively smaller sample sizes in ASHE compared with the LFS for particular age groups in particular years, breaking down the data by region and age group would not enable us to draw credible inferences. (In some regions, such as the North East, there are fewer than 100 observations on 16- to 17-year-olds in most years.) Hence, we group together all young people aged 16–21 when looking at regional variation. Table 2.5 shows the percentage of 16- to 21-year-old employees in full-time work by region over time. Overall, there has been a decline in the proportion of young employees working full-time in every region over the past 13 years, with some regions – such as the North East and the South West – experiencing particularly marked declines since the recession.

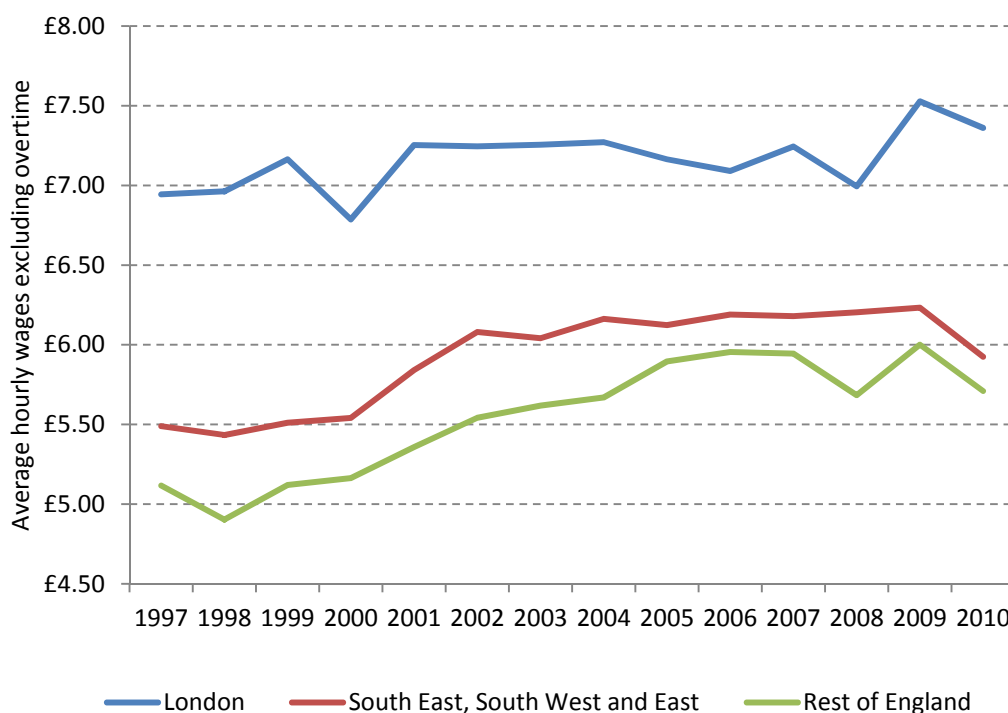
Figures 2.33 and 2.34 summarise average hourly wages by region, grouping together those in the ‘south’ (the South East, South West and East regions) and the ‘north’ (the North East, North West, Yorkshire & the Humber, and the East and West Midlands), and comparing these with London. It is clear from these figures that London has the highest wages for young people in both full- and part-time work. As Figure 2.33 illustrates, the average hourly pay among full-time workers aged 16–21 in London has always been £1.50–£2.50 higher than in the rest of England, although growth in youth pay has been slower here than in other parts of England over the past 13 years. Perhaps unsurprisingly, the ‘south’ also tends to have higher full-time wages than the ‘north’, although wages for part-time workers are rather more similar (see Figure 2.34). Note that these figures do not take into account any regional variations in prices or living costs, which tend to be higher in those high-wage regions.

Table 2.5 Percentage of 16- to 21-year-old employees in full-time work by region in England over time

	North East	North West	Yorkshire and the Humber	East Midlands	West Midlands	South West	East	London	South East
1997	52%	53%	49%	52%	52%	51%	54%	47%	52%
1998	52%	56%	54%	58%	53%	53%	55%	47%	58%
1999	51%	52%	56%	52%	55%	53%	56%	44%	58%
2000	55%	55%	56%	52%	53%	51%	58%	45%	55%
2001	49%	51%	52%	54%	51%	50%	56%	45%	54%
2002	49%	50%	48%	52%	47%	53%	53%	45%	52%
2003	51%	48%	50%	50%	48%	48%	51%	42%	50%
2004	47%	48%	49%	50%	46%	49%	48%	43%	52%
2005	48%	49%	52%	50%	45%	51%	47%	48%	50%
2006	50%	49%	53%	51%	50%	52%	51%	50%	48%
2007	46%	50%	51%	52%	48%	52%	50%	49%	48%
2008	48%	45%	49%	47%	46%	51%	50%	48%	47%
2009	48%	42%	45%	49%	44%	47%	48%	46%	46%
2010	40%	42%	44%	45%	42%	41%	44%	40%	39%

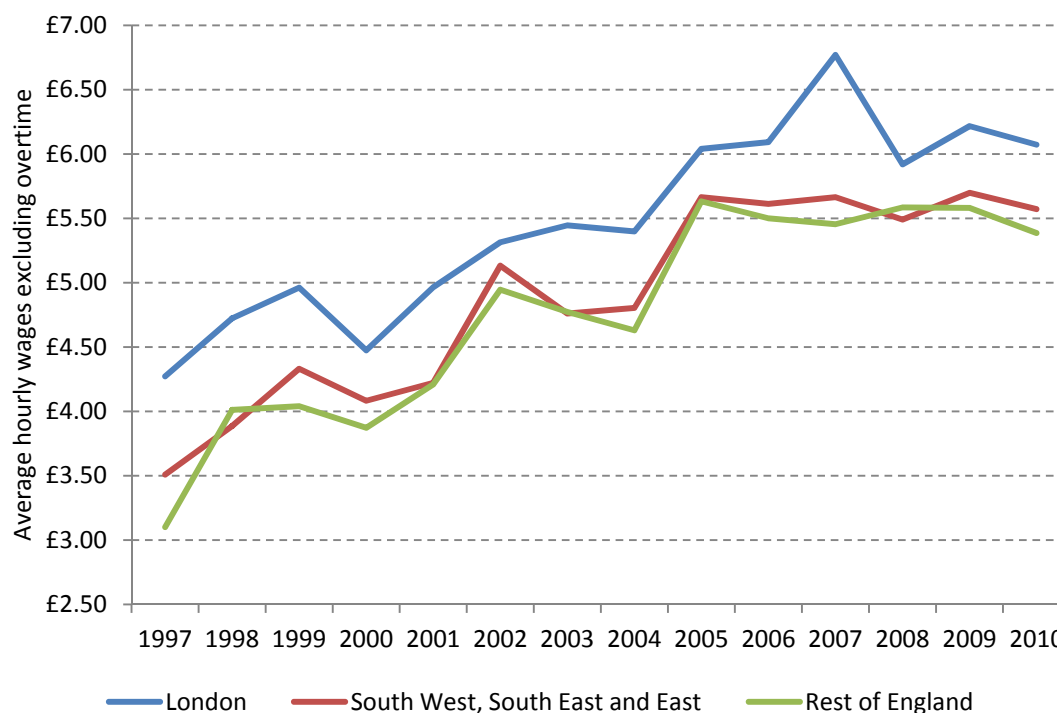
Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010. The number of 16- to 21-year-olds per region per year averages around 1,200, and ranges from 350 to over 2,000.

Figure 2.33 Average hourly pay excluding overtime amongst full-time employees aged 16–21 by region over time



Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010, using 2004 prices. It excludes observations with hourly wages higher than £200. The 'rest of England' covers the North East, North West, Yorkshire & the Humber, and the East and West Midlands.

Figure 2.34 Average hourly pay excluding overtime amongst part-time employees aged 16–21 by region over time



Notes: This analysis is based on weighted data from the Annual Survey of Hours and Earnings, 1997 to 2010, using 2004 prices. It excludes observations with hourly wages higher than £200. The 'rest of England' covers the North East, North West, Yorkshire & the Humber, and the East and West Midlands.

2.5 Summary

Using descriptive data from the LFS and ASHE, this chapter has examined the trends in young people's education and labour market choices before, during and after the recession. We found the following:

Education and labour market choices

- Education participation amongst 16- to 17-year-olds has been steadily increasing over time, a trend that continued during and after the recent recession.
 - The rise in participation is more substantial for males than for females.
 - Since the recession, education participation has increased dramatically for those without Level 2 qualifications, suggesting that this group may be avoiding the impact of the recession by remaining in education longer than they otherwise would have done.
- The proportions of unemployed and inactive (NEET) 16- to 17-year-olds have remained largely unchanged since the start of the recession.
 - In fact, there were noticeable falls in the NEET rate among individuals with Level 1 qualifications or below and among individuals from poorer backgrounds. This suggests that it is low-qualified individuals who would otherwise have become NEET who are now moving into education as a result of the recession, rather than individuals who might otherwise have been expected to go into work.
- The proportion of 18- to 21-year-olds who were unemployed increased by about 3 percentage points over the course of the recession and this higher level of unemployment has persisted since then.
 - The increase in unemployment since the recession has been larger for males than for females.

- White 18- to 21-year-olds appear to have been hit harder by the recession – or have been able to respond to it less well – than people of the same age from ethnic minorities, at least in terms of unemployment and inactivity rates.
- The proportion of 18- to 21-year-olds who were NEET increased more amongst those with no or low levels of qualifications than amongst those with Level 3 or 4 qualifications, although the former already had substantially higher NEET rates than the latter.
- By contrast, the proportion of young people aged 18–21 in education remained largely unchanged over the course of the recession, suggesting that the barriers to staying in education may be higher for 18- to 21-year-olds than for 16- to 17-year-olds.

Full-time vs part-time work

- The proportion of young employees who work full-time rather than part-time has decreased substantially over the last 13 years and this trend continued during the recession. This is true for both 16- to 17- and 18- to 21-year-olds.
- The proportion of 16- to 17-year-old girls who work full-time has always been significantly lower than the proportion of boys of the same age who do, and both have fallen substantially in the past 13 years. For males aged under 21, the recent recession seems to have sped up the declining trend of full-time work.

Hours

- There was a small decrease in the average number of hours worked by full-time employees between 2008 and 2009, coinciding with the recession. This effect was greatest for those aged 16–17 and 18–21, and less discernible for those aged 22–64. On the other hand, there was little change in average hours worked amongst part-time employees over the course of the recession.

Wages

- The average full-time wage amongst 16- to 17-year-olds fell significantly between 2009 and 2010, while it fell less among 18- to 21-year-olds and little among adults.
- Over the last decade, average hourly wages amongst part-time youth employees have increased in real terms but fallen relative to adults', and real wages have stagnated for all age groups since the recession.
- There are almost no pay differences between males and females aged 16–17 or 18–21 amongst either full-time or part-time employees. While young people working in London are paid markedly higher wages than those working in other areas of England, London has experienced slower growth in youth pay than other areas over the past 13 years.

3 What role do wages and unemployment rates play in determining the labour market choices of 16- to 18-year-olds?

At the moment, young people in England must remain in full-time education (FTE) until the end of the academic year in which they turn 16.¹⁷ After this age, they can choose whether to continue in full-time education. If they choose to leave FTE, they may go into part-time education, full-time or part-time work, or an apprenticeship or training. If they choose none of these activities then they are classified as ‘NEET’ (not in education, employment or training). Many factors are likely to affect an individual’s decision, including the young person’s enjoyment of and prior attainment at school, their family circumstances, their own aspirations and local labour market conditions. This chapter investigates the determinants of young people’s participation decisions empirically, focusing on the role of labour market conditions, particularly real wages and unemployment rates, in their local area.

This analysis closely follows the work of De Coulon et al. (2010), which was also commissioned by the Low Pay Commission (LPC). Like them, we use data from the Longitudinal Study of Young People in England (LSYPE) – a rich longitudinal data set of contemporary young people – combined with information from other sources on local youth wages, youth unemployment and house prices (as a proxy for the general level of prices) to investigate the role of local labour market conditions in young people’s education and labour market choices.

We extend the work of De Coulon et al. in two important ways. First, we consider a more disaggregated set of outcomes (as opposed to the decision to remain in FTE only).¹⁸ The binary outcomes we consider are:

- whether the young person is NEET;
- whether the young person is in FTE;
- whether the young person drops out of FTE, given that they were in post-compulsory FTE the previous year;
- whether the young person is in work, given that they are in FTE;
- whether the young person is in work, given that they are *not* in FTE.

Second, we are also able to investigate how local labour market conditions affect young people’s education and labour market choices at ages 17/18 and 18/19 as well as 16/17. Dickerson and Jones (2004) use the Youth Cohort Study (YCS) to show that employment and education choices of young people between 16 and 18 are relatively stable, as the majority of young people who continue in education at age 16 also continue further in education at age 18. It is reasonable to hypothesise, however, that local labour market conditions may affect young people differently at these two stages – for example, as they become more mobile.

¹⁷ The current requirement is about to change. The Education and Skills Act 2008 requires young people to continue in education or training until the end of the academic year in which they turn 17 from 2013, and to the end of the academic year in which they turn 18 from 2015. Raising the participation age (RPA) does not mean that all young people must stay in full-time education; they will also be able to undertake work-based learning, such as an apprenticeship, or part-time education or training if they are employed or self-employed or volunteering for more than 20 hours a week. For more details of this change, see <http://www.education.gov.uk/16to19/participation/rpa>.

¹⁸ De Coulon et al. (2010) also present estimates from a multinomial logit model which contains a wider set of options. It is not clear, however, that the assumption of the independence of irrelevant alternatives (IIA) – which states that the odds of choosing between two options are determined without reference to other options that might be available, and underlies the use of the multinomial model – holds in this context and so we do not pursue that strategy here.

To validate our results, we also present estimates for the impact of local labour market conditions at a smaller geographical level than De Coulon et al. (2010). This smaller geography arguably better represents the relevant local labour market for young, less mobile, people than larger areas such as government office regions (GORs). There is, however, a trade-off here. Although the smaller geography may be preferable, the measures of wages and unemployment we are forced to use in this case are less relevant to young people as they span a wider age range.

A summary of the differences between the analysis in this chapter and that in De Coulon et al. (2010) is presented in Table 3.1. The remainder of this chapter proceeds as follows. Section 3.1 summarises existing evidence on the effect of local labour market conditions on education and labour market choices. Section 3.2 discusses the data that we use and Section 3.3 outlines the methodology that we adopt. Section 3.4 presents our main results alongside a series of robustness checks. Section 3.5 summarises our findings from this analysis.

Table 3.1 Differences between analysis in De Coulon et al. (2010) and this chapter

De Coulon et al., 2010	This chapter
Investigate decisions of young people at age 16/17.	Investigate decisions of young people at ages 16/17, 17/18 and 18/19.
Consider the impact of <i>average</i> youth wages defined at the local authority (LA) and government office region (GOR) levels. There are nine GORs in England. De Coulon et al.'s LA level is similar to our UA/C level.	Consider the impact of <i>median</i> youth wages defined at the unitary authority / county (UA/C) level. There are 87 UA/Cs in England and 141 in Great Britain, including 'Greater London'. Additional analysis considers the impact of average youth wages and wages at the 10 th and 25 th percentiles of the youth wage distribution. We also check whether our results are robust to defining local labour market variables at a smaller geographic level, but for a slightly wider age range.
Use a logit to model the impact of local labour market conditions on the decision to remain in post-16 education.	Use a probit to model the impact of local labour market conditions on a wider set of possible post-16 destinations.
Use a multinomial logit model to estimate the impact of local labour market conditions on possible post-16 destinations.	Do not use a multinomial logit model, as it is unlikely that one important assumption of the model (the independence of irrelevant alternatives) holds.
Present separate estimates for males and females from the logit model and investigate differences by attainment level by looking at differences in the predicted probability of continuing in FTE.	Present separate estimates for those with high/low levels of previous educational attainment and by family income.

3.1 Previous empirical evidence

Previous empirical literature has investigated the role of local labour market conditions in the decision to participate in post-compulsory education. Two different methodological approaches have been used to address this question. The first uses time-series data to ask whether changes in labour market conditions over time affect the proportion of young people who decide to continue in education. The second uses cross-sectional individual-level data (and tends to control for other determinants of education participation) and relies on variation in local labour market conditions across areas to identify impact. We discuss the results of each in turn, starting with the time-series studies.

Pissarides (1981) analyses time-series data for the UK for 1955–78 and finds that real household income and relative earnings of qualified workers affect the enrolment rates of males and females in full-time

education. Youth unemployment is not significantly related to enrolment rates, but registered adult unemployment seems to increase male enrolment rates (while not significantly affecting female enrolment rates). The positive effect of registered unemployment indicates that 'the staying-on rate has a cyclical component, being higher than otherwise when unemployment is high The reason for this cyclical component is the higher risk of unemployment suffered by adult workers who left school early; youths anticipate this risk, and at the trough of a cycle, when the risk is higher, more of them are willing to stay on at school' (Pissarides, 1981, p.354).

Whitfield and Wilson (1991) repeat the model used by Pissarides over a longer period (1955–85) and also attempt to account for the impact of changes in social class structure and youth training schemes on participation. Like Pissarides, Whitfield and Wilson find a significant negative impact of the level of adult unemployment on the probability of remaining in full-time education post-16, although they do not consider the role of youth unemployment as the two measures are highly correlated and therefore difficult to identify separately.

McVicar and Rice (2001) also use time-series data to assess the impact of local labour market conditions on the staying-on rate. They further extend the period considered to include years between 1988 and 1994, the period covering the last major recession in the UK in which education participation rates grew significantly. Their results show that the rapid increase in participation was largely driven by improvements in GCSE attainment – national exams taken at the end of compulsory schooling – coupled with the expansion of the higher education sector and increasing returns to skilled labour. They also find that the sharp rise in the unemployment rate in the early 1990s significantly contributed to the growth in full-time post-compulsory education participation.

Moving on to consider the results of some cross-sectional studies, Micklewright, Pearson and Smith (1990) use data on Great Britain from the Family Expenditure Survey (FES) for the period 1978–84. During this time, unemployment rose sharply, but the authors do not find any significant impact of the local unemployment rate (measured at government office region) on the participation decision of 16-year-olds.¹⁹

Rice (1999) uses data on England and Wales from the Youth Cohort Study (YCS), coupled with labour market data (at local authority level), and finds a significant impact of the local unemployment rate on the probability of remaining in full-time education rather than seeking employment. The YCS contains a more detailed set of background characteristics than the FES, and Rice is therefore able to investigate the impact of a wider set of influences; her findings show that academic qualifications and family background are the most influential determinants, but that local labour market conditions also play a role in the decision to participate in post-compulsory education. In particular, Rice shows that short-run movements in the demand for labour, as reflected by changes in local unemployment rates, affect the decision to invest in further education. As expected, the effects are not uniform; local labour market conditions mainly influence young males with weaker academic qualifications, whose decision is likely to be more marginal.

Frayne and Goodman (2004) consider the role of youth wages in addition to youth unemployment rates. They use data collected for an evaluation of the Education Maintenance Allowance (EMA) – a means-tested payment of up to £30 a week during term time for young people living in poorer households²⁰ – comprising a longitudinal sample of approximately 19,000 young people in both the EMA pilot areas and

¹⁹ They use a measure of total unemployment in the quarter and region of interview, without distinguishing between youth and adult unemployment.

²⁰ To be eligible for EMA in 2010–11, household income in the financial year 2009–10 needed to be below £30,810. To be eligible for the maximum rate of £30 per week, household income needed to be below £20,817.

specially selected comparison areas. The authors estimate a structural model of work and schooling decisions amongst 16- and 17-year-olds, in which the decision to take up a job and the decision to remain in school depend upon predicted potential wages in the labour market and a set of other characteristics (including gender, previous educational attainment, parental characteristics and other financial incentives, such as EMA entitlement if in school). Frayne and Goodman's estimates show a low elasticity of labour supply to wages. Using these estimates, they calculate that introducing a national minimum wage (NMW) in October 2004 at £3.00 or £3.50 per hour would make little difference to the number of young people wanting to work, either by leaving school and joining the labour market or by combining school and part-time work.

Dickerson and Jones (2004) arrive at similar conclusions by developing a model that suggests that while the effects of a minimum wage can be large under certain assumptions, under the distribution of ability which accords most closely with that observed in the YCS data (in which there is a highly unequal distribution of GCSE attainment), the marginal impact of the introduction of a minimum wage on participation in full-time education is likely to be very small. In particular, they predict that a minimum wage introduced at between £2.50 and £4.00 per hour would have negligible effects on education participation.

Building on this work, De Coulon et al. (2010) use the LSYPE to investigate the role of local labour market conditions (including youth wages and youth unemployment rates) in the post-compulsory participation decision using a binary choice model and a multinomial logit model. Results from the two models are broadly consistent; accounting for a wide set of other factors, local labour market conditions play a very small role, if any, in young people's decisions. Background characteristics such as ability and socio-economic status appear to be much more important determinants of participation, although results from the binary choice model suggest that young people with lower academic attainment are more responsive to changes in local youth wages than are those with high prior attainment, though the authors make clear that the magnitude of the wage effect is small and often not statistically different from zero. They also find some differences according to the size of the local labour market, with youth wages and unemployment measured at the local authority level having no impact on the decision to remain in full-time education, but youth unemployment measured at the government office region level having a small positive impact.

In a related study, Dearden et al. (2009) show that the education participation decisions of young people are affected by changes in the relative costs and benefits of work and study. Participation in full-time education significantly increased for the target population following the introduction of the Education Maintenance Allowance in September 2004. The EMA has since been abolished (in January 2011), although a replacement bursary scheme was introduced in September 2011.²¹ The relative costs and benefits of work and study for future cohorts of young people are therefore likely to be different from those of the LSYPE cohort – for whom the EMA was available – although we still believe that our results are informative about decisions made by current cohorts of young people.

Finally, Clark (2011) combines the cross-sectional and time-series approaches by using a 30-year panel (1975–2005) of regional data to exploit the variation in staying-on rates and unemployment *over time and between regions*. His main finding is that local youth unemployment rates have a positive, significant and large effect on participation rates.²²

²¹ <http://www.education.gov.uk/childrenandyoungpeople/strategy/laupdates/a0076274/consultation-on-arrangements-for-new-16-19-bursary-fund>.

²² The author states that the magnitude of the effect found is at least twice as large as those previously estimated in the literature (Clark, 2011, p.533).

To summarise this evidence, it seems that empirical studies using time-series methods tend to find a significant role of unemployment in the education participation decision and some evidence of a positive role for expected wages. Studies that have used individual-level data to investigate the role of local labour market conditions on young people's education choices, on the other hand, are less conclusive. The advantage of individual-level data is that the role of local labour market conditions can be evaluated relative to other factors such as family background and prior attainment; the consensus from papers that adopt such methods is that academic attainment and family background are the dominant determinants of participation in post-compulsory education, while local labour market conditions play only a small role. The inability to account for rich individual characteristics in most time-series studies may thus give rise to biased estimates of the impact of local labour market conditions on the likelihood of being in full-time education if, for example, local wages and average prior attainment are correlated. In this case, we might expect the time-series estimates to be biased upwards, suggesting that the results from the time-series and cross-sectional studies discussed above may not be entirely inconsistent.

3.2 Data

Following De Coulon et al. (2010), we use the rich data available in the Longitudinal Study of Young People in England combined with local labour market information from other sources to carry out our analysis. We have access to more recent LSYPE data than De Coulon et al. – up to 2008–09 – allowing us to extend their analysis and consider young people's outcomes at ages 17/18 (henceforth age 17) and 18/19 (henceforth age 18) as well as 16/17 (henceforth age 16). Appendix Table A.1 shows how the activity status of young people changes over time. For example, while 72% of young people are in full-time education at age 16, only 45% are still participating at age 18. This suggests a potentially greater role for local labour market conditions in driving the education participation decisions of older teenagers.

We take a measure of local wages from the Annual Survey of Hours and Employment (ASHE), defined at the unitary authority / county level for young people aged 16–24 in 2006. We use data for individuals aged 16–24 because there are too few individuals aged 16–17 in some UA/C areas in ASHE to make these wage figures robust. We pick 2006 because it relates to the year in which LSYPE cohort members were sitting their GCSEs and making decisions about whether or not to continue in full-time education. We use the median level of wages for this group, rather than the mean, in our main specification, as the median is more robust to outliers. Figure 3.1 shows the variation in median wages for young people across England. We have also run robustness checks using local wages defined at the mean and at the 10th and 25th percentiles, with qualitatively similar results.²³

Our measure of local unemployment for young people is taken from the Annual Population Survey (downloaded from the NOMIS website²⁴), again defined at the UA/C level for young people aged 16–24 in 2006. Figure 3.2 shows the variation in average unemployment for young people across England.

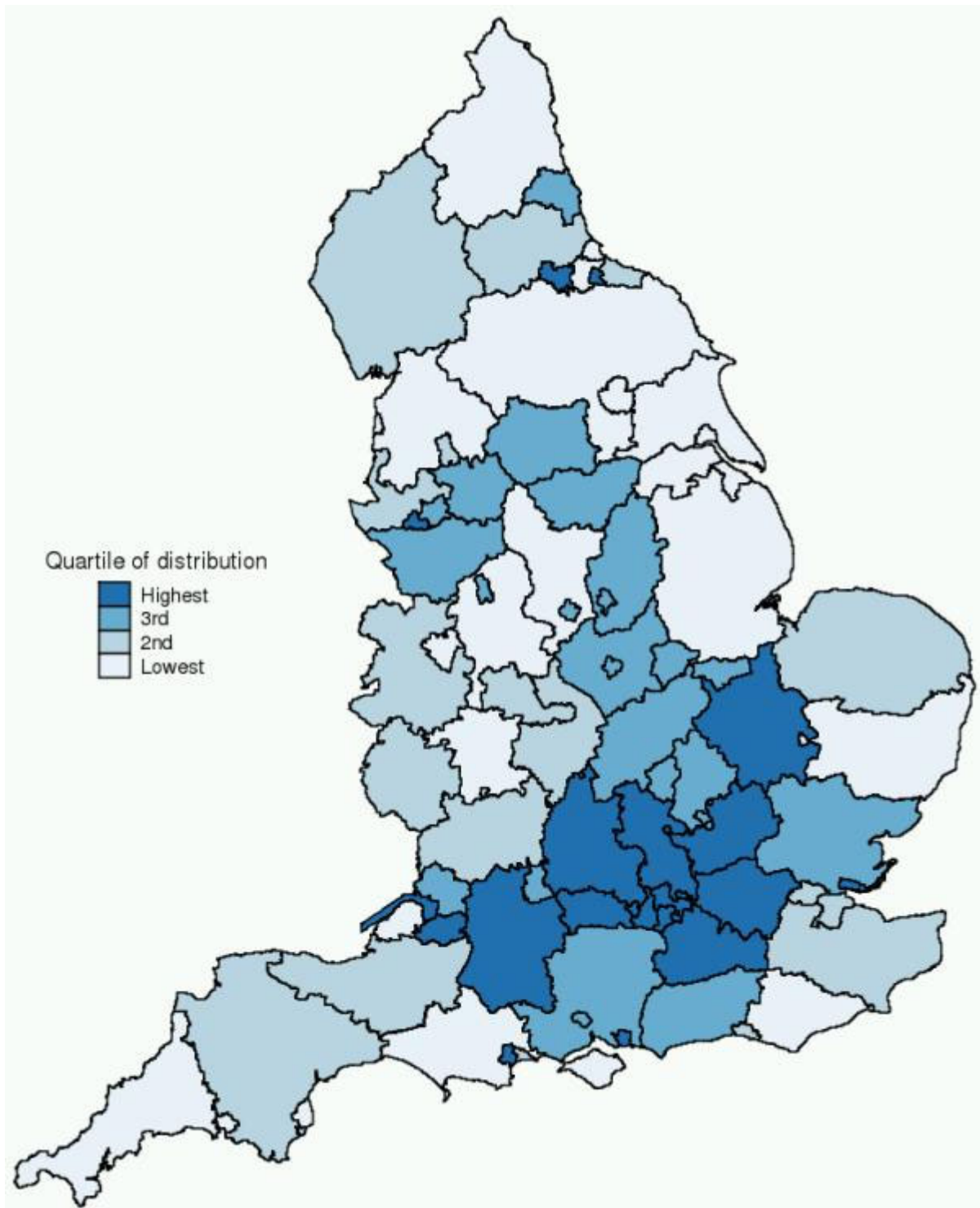
To account for different levels of prices which will affect the purchasing power of individuals in different areas, we use the only source of price variation across regions that we are aware of: information on average house prices, aggregated to the UA/C level in 2006.²⁵ This information is taken from the

²³ These results are available from the authors on request.

²⁴ <http://www.nomisweb.co.uk/>.

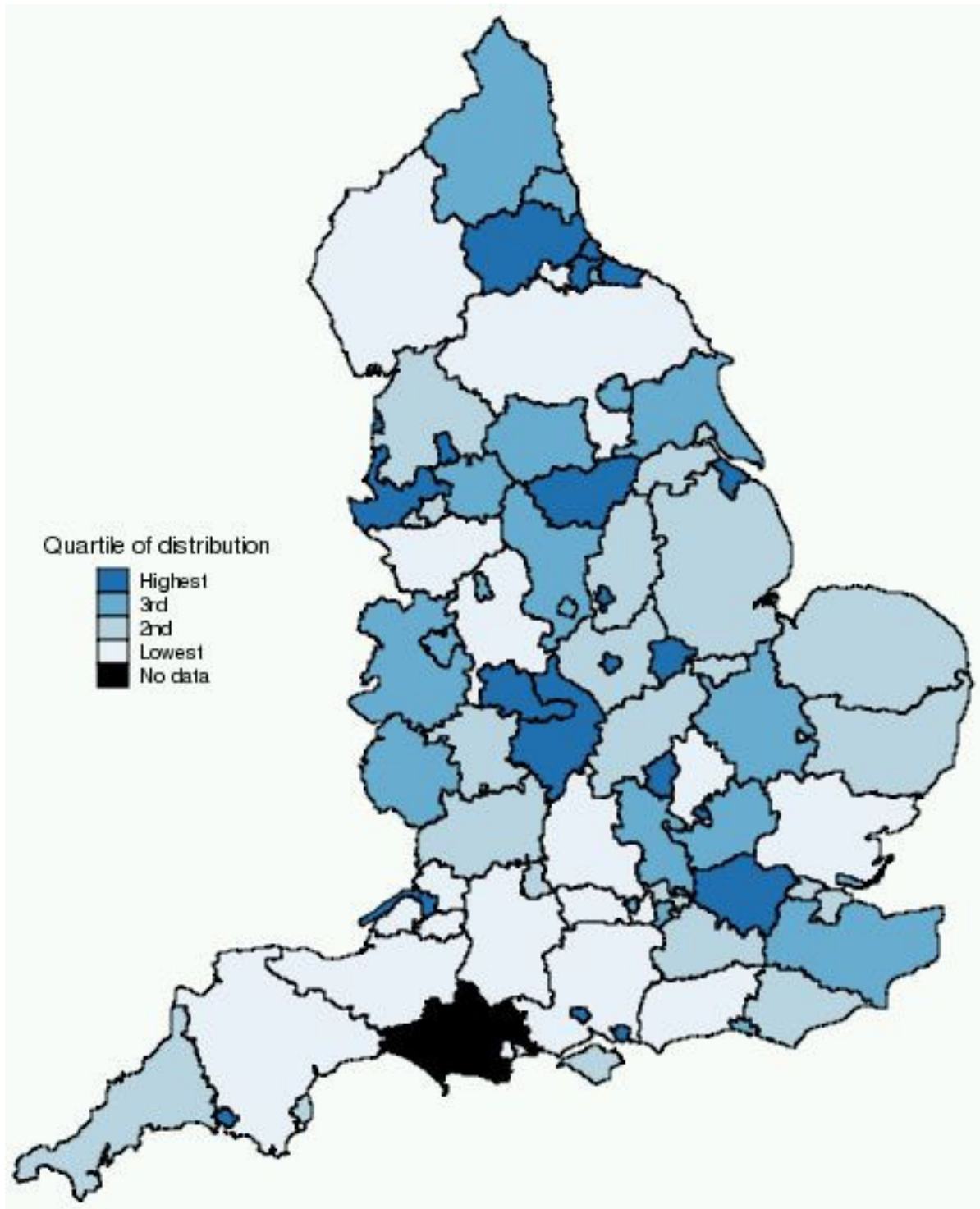
²⁵ The data are available at the local authority district (LAD) level. There are currently 354 LADs in England, with populations ranging from 2,200 to 1,028,700 in 2009 (for more details, see <http://www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/glossary/glossary-l.html>). We aggregate the data to UA/C level by weighting according to the population in each LAD.

Figure 3.1 Median hourly wages for 16- to 24-year-olds in England in 2006, measured at the unitary authority / county level



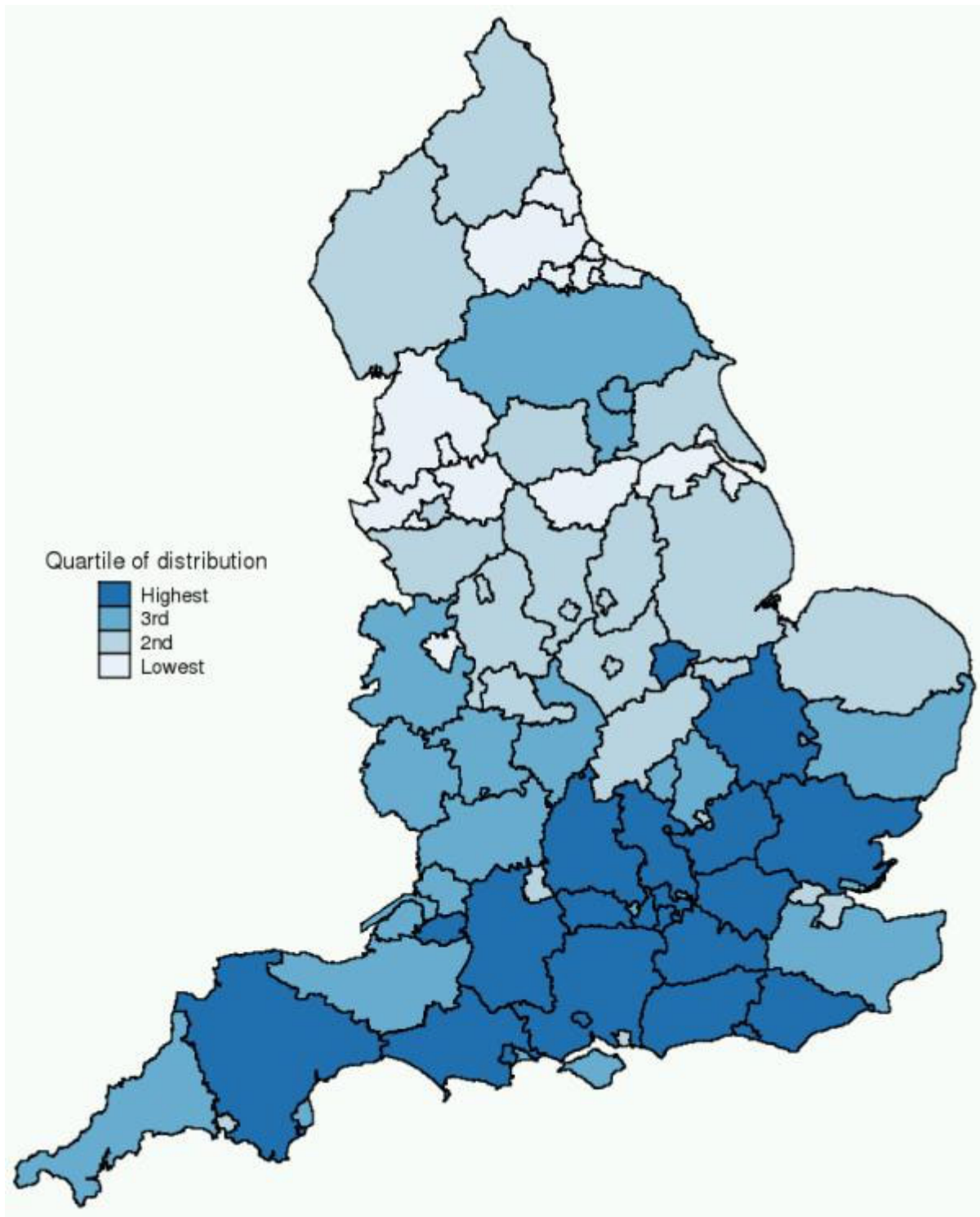
Notes: This analysis is based on data from the Annual Survey of Hours and Earnings. Quartiles are not weighted by population. The lowest quartile ranges from £5.08 to £5.65 per hour; the 2nd quartile ranges from £5.65 to £5.86 per hour; the 3rd quartile ranges from £5.86 to £6.12 per hour; and the highest quartile ranges from £6.12 to £7.23 per hour. All wages are in 2006 prices.

Figure 3.2 Average unemployment rate for 16- to 24-year-olds across England in 2006, measured at the unitary authority / county level



Notes: This analysis is based on data from the Annual Population Survey. Quartiles are not weighted by population. The lowest quartile ranges from 5.8% to 9.9%; the 2nd quartile ranges from 9.9% to 13%; the 3rd quartile ranges from 13% to 16%; and the highest quartile ranges from 16% to 28.1%.

Figure 3.3 Average house prices across England in 2006, measured at the unitary authority / county level



Notes: This analysis is based on data from the Communities and Local Government monthly house price index. Quartiles are not weighted by population. The lowest quartile ranges from £80,000 to £123,000; the 2nd quartile ranges from £123,000 to £157,000; the 3rd quartile ranges from £157,000 to £181,000; and the highest quartile ranges from £181,000 to £274,000. All prices relate to 2006.

Communities and Local Government monthly house price index, which is a weighted average of prices for a standard mix of dwellings.²⁶ Figure 3.3 shows the variation in average house prices across England.

As shown in Figures 3.1 to 3.3, high house prices and wages are generally concentrated in the south-east of the country and have a high degree of correlation, but high unemployment is less geographically concentrated and is uncorrelated with the level of wages in the area. Correlations between various measures of local labour market conditions are given in Appendix Table A.2.

We are unaware of any research that estimates the size of the relevant local labour market for young people across the country. It is reasonable to suppose, however, that young people in a given location are less mobile than older adults – for example, if they are unable to drive. Travel costs for interviews further afield may also be prohibitive for teenagers without resources. These factors imply that the relevant local labour market may be smaller for young people than for older adults. Under this reasoning, local labour market conditions measured at UA/C level may not be the appropriate ones to consider for young people. To test the robustness of our results, we thus repeat our analysis using local wage and unemployment rates measured at the smaller parliamentary constituency (PC) level.²⁷ These results are discussed at the end of Section 3.4.

3.3 Methodology

Our methodology aims to determine the impact of local labour market conditions on a range of outcomes modelled as binary choices, namely:

- whether the young person is NEET;
- whether the young person is in FTE;
- whether the young person drops out of FTE, conditional on having been in post-compulsory FTE the previous year;
- whether the young person is in work, conditional on being in FTE;
- whether the young person is in work, conditional on *not* being in FTE;

In each case, we assume that individuals have an underlying utility from each option, which will depend on the individual-specific expected costs and benefits.

Below, we motivate our methodology by describing the assumptions made when analysing the decision to remain in FTE relative to all other activities. The same methodology is applied to each of the other outcome variables.

First, we assume that there is an underlying likelihood (or *latent variable*) of observing a young person in FTE rather than any other activity, which we denote y^* .²⁸ A higher value of y^* increases the likelihood that the young person will remain in FTE and a lower value decreases the likelihood. This latent variable will depend on many factors that reflect both the costs and benefits of continuing in post-compulsory education – for example, the young person’s enjoyment of and previous attainment at school, the cost of transport and books, expected forgone earnings while in education, and more general local labour market conditions. We assume that y^* is linearly related to these factors through the model:

²⁶ More information can be found at <http://www.communities.gov.uk/housing/housingresearch/housingstatistics/housingstatisticsby/housingmarket/overview/housingmarketstats/>.

²⁷ There are 533 PCs in England (without aggregating all PCs in Greater London). PCs are formed to have roughly equal numbers of people living in each one, typically around 90,000 people (<http://www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/electoral/westminster-parliamentary-constituencies/index.html>).

²⁸ Note that the model can be motivated without reference to an underlying latent variable that determines participation, but in this case the reference is instructive.

$$y_i^* = \mathbf{x}_i\boldsymbol{\beta} + \mathbf{z}_i\boldsymbol{\gamma} + \varepsilon_i$$

where \mathbf{x}_i is a vector of characteristics of the young person and their background, and \mathbf{z}_i is a vector of characteristics of the local labour market, including the levels of wages, unemployment and prices young people face. The final term, ε_i , represents the random or unobserved determinants of the choice of young people, which creates a probabilistic rather than deterministic model.

The latent variable is linked to the observed binary variable y by the cut-off rule:

$$y_i = \begin{cases} 1 & \text{if } y_i^* > \tau \\ 0 & \text{if } y_i^* \leq \tau \end{cases}$$

where τ is the threshold that determines whether the net benefit of remaining in post-compulsory education for individual i is great enough to induce participation. By assuming a specific form for the distribution of ε , it is possible to compute the probability that $y = 1$ for a given set of characteristics \mathbf{x} . Specifically, by assuming that ε follows a normal distribution with a mean of 0 and standard deviation of 1, we obtain the following probit model of binary choice:

$$P(y = 1|\mathbf{x}) = F(\mathbf{x}\boldsymbol{\beta} + \mathbf{z}\boldsymbol{\gamma})$$

where F is the normal cumulative distribution function.

Estimates of the parameters $\boldsymbol{\beta}$ and $\boldsymbol{\gamma}$ are obtained through maximum likelihood estimation.

Appendix Table A.3 details the background characteristics of the young people and their families (\mathbf{x}) that are likely to affect post-compulsory schooling decisions and that we are able to consider. These include demographic and family background characteristics (including parents' education, work status and benefit receipt), measures of prior attainment and some school characteristics from the National Pupil Database (an administrative data set maintained by the Department for Education), and information on a range of attitudes and behaviours, such as the young people's own aspirations for further and higher education and engagement in various risky behaviours – for example, playing truant. \mathbf{z} includes the set of local labour market characteristics described in Section 3.2. For ease of interpretation and flexibility, they are entered using a set of binary variables representing quartiles of the national distribution of median wages for 16- to 24-year-olds, unemployment rates for 16- to 24-year-olds and house prices (as shown in Figures 3.1 to 3.3 above).

In general, we use the earliest available measures of each of the characteristics we observe. A good example of this rule in practice is the choice between two measures that aim to capture the underlying ability of the young person (which is expected to influence post-compulsory education participation by altering the cost of further education). The first option is a score from exams taken at the end of primary school (at age 10/11). The second option is a score from exams taken at the end of post-compulsory schooling (at age 15/16), which is likely to be affected by effort, expectations and aspirations, as well as ability, all of which may have been influenced by local labour market conditions. For example, those who have already decided not to enter post-compulsory education, perhaps because of a particularly buoyant youth labour market, have less incentive to perform well and so may exert less effort. Controlling for these age 15/16 results would therefore underestimate the impact of the youth labour market on participation. We therefore choose to include an average point score from exams taken much earlier to capture the young person's underlying level of ability. Most other characteristics – for example, whether the young person engages in risky behaviours such as smoking or truancy – are derived from questions asked at age 13/14.

3.4 Results

The purpose of this section is to inform the Low Pay Commission (LPC) and the wider community about whether local labour market conditions – specifically, local wage and unemployment rates for young

workers – have an impact on the activity decisions of young people in England. Our main finding is that local labour market conditions – and local wages in particular – play little or no role in determining the education participation decisions of young people (confirming the results in De Coulon et al. (2010)).

Although we do not discuss the results at length here, our findings also confirm those from previous work commissioned by the LPC and elsewhere that a young person’s academic ability and family background are the main determinants of the education participation decision, while the role of local labour market conditions – in particular, the local wage rate for young people – is limited. Full results showing the impact of background characteristics on young people’s education and labour market choices are given in Appendix Table A.4.

Table 3.2 presents the estimates for each of our five main outcomes of interest. Each outcome is observed at three different ages (16, 17 and 18), except for whether they drop out of full-time education conditional on being in post-compulsory education the previous year, which is only observed twice. Estimates from each age are based on separate regressions without imposing a common sample, and are presented in separate columns in Table 3.2. The table reports marginal effects, so a figure of 0.06, for example, is equivalent to an increase of 6 percentage points from the reference level – the mean of the outcome in the reference category. The reference levels are given in the first and fifth rows of Table 3.2 for wages and unemployment respectively.

The impact of median wages for young people in the local area is presented in the second to fourth rows of the table. The numbers in the second row are interpreted as the average percentage point impact on the outcome in question of living in an area in the second-lowest quartile of median wages for young people, relative to the lowest quartile of median wages (the reference category). Similarly, the numbers in the third row are interpreted as the average percentage point impact of living in an area in the third-lowest quartile of median wages relative to the lowest, and so on. Similar interpretations also apply to the differences in local youth unemployment rates.

To attempt to account for the different costs of living across the country, each regression includes a similar set of binary variables for the quartile of average house prices.²⁹ The inclusion of these variables attempts to reflect the potential *real* wage that young people could expect from the labour market, although house prices do not perfectly reflect the cost of living for young people.

The top panel of Table 3.2 suggests that, after accounting for a wide range of individual characteristics that might affect their decisions, local youth wages play very little role in determining young people’s education and labour market choices.

By contrast, the bottom panel of Table 3.2 suggests that local youth unemployment rates make some difference to some decisions at some ages. For example, our results suggest that 18-year-olds living in areas with higher youth unemployment rates are more likely to stay in full-time education than those living in areas with lower unemployment rates. This is consistent with the theory that when youth unemployment is high, the expected gains to job search are reduced and the opportunity cost of education is lower. The impact is quantitatively significant: those living in an area in the highest quartile of unemployment are 9.1 percentage points more likely to remain in FTE at age 18 than those in the lowest quartile of unemployment. Relative to the base of 37% of young people in FTE at age 18 in the reference area, the impact of unemployment is equivalent to a 25% increase in the proportion remaining in FTE.

²⁹ We have repeated our analysis using a continuous measure of house prices rather than a series of binary indicators. In practice, this has little impact on the point estimates or significance level of the results. Full results are available from the authors on request.

Table 3.2 The impact of local labour market conditions on post-compulsory education decisions: marginal effects from probit regression

<i>Local labour market conditions (at UA/C level)</i>	<i>Binary outcome</i>									
	<i>NEET</i>			<i>FTE</i>			<i>Drop out of FTE, conditional on being in FTE in the previous year</i>			
	<i>Age 16 (2006-07)</i>	<i>Age 17 (2007-08)</i>	<i>Age 18 (2008-09)</i>	<i>Age 16 (2006-07)</i>	<i>Age 17 (2007-08)</i>	<i>Age 18 (2008-09)</i>	<i>Age 16 (2006-07)</i>	<i>Age 17 (2007-08)</i>	<i>Age 18 (2008-09)</i>	<i>Age 18 (2008-09)</i>
<i>Reference level for those in the lowest quartile of wages</i>	0.080	0.092	0.145	0.703	0.530	0.429	-	0.318		0.340
Median wages for 16- to 24-year-olds: quartile 2	0.010 [0.008]	-0.015 [0.012]	0.010 [0.015]	-0.006 [0.018]	-0.000 [0.023]	0.029 [0.022]	-	0.009 [0.022]		-0.041 [0.025]
Median wages for 16- to 24-year-olds: quartile 3	0.001 [0.008]	0.004 [0.012]	0.004 [0.015]	0.004 [0.017]	-0.022 [0.024]	0.004 [0.024]	-	0.032 [0.024]		-0.052 [0.029]
Median wages for 16- to 24-year-olds: highest quartile	0.005 [0.011]	0.008 [0.015]	0.001 [0.017]	-0.007 [0.023]	-0.021 [0.025]	0.006 [0.033]	-	0.046 [0.026]		-0.027 [0.033]
<i>Reference level for those in the lowest quartile of unemployment</i>	0.081	0.090	0.147	0.704	0.513	0.370	-	0.337		0.385
Average unemployment for 16- to 24-year-olds: quartile 2	-0.003 [0.008]	-0.011 [0.013]	-0.019 [0.014]	0.008 [0.017]	0.000 [0.026]	0.071*** [0.022]	-	-0.005 [0.026]		-0.059** [0.025]
Average unemployment for 16- to 24-year-olds: quartile 3	-0.002 [0.007]	0.016 [0.012]	-0.025 [0.015]	-0.010 [0.018]	0.006 [0.024]	0.098*** [0.024]	-	-0.031 [0.024]		-0.081*** [0.025]
Average unemployment for 16- to 24-year-olds: highest quartile	-0.004 [0.008]	0.028** [0.013]	-0.018 [0.016]	0.008 [0.019]	0.020 [0.024]	0.091*** [0.027]	-	-0.031 [0.024]		-0.071** [0.030]
<i>N</i>	11,117	9,892	9,236	11,117	9,892	9,245	-	7,797		5,385
<i>R</i> ²	0.215	0.123	0.127	0.264	0.153	0.157	-	0.068		0.059

Notes: All models include controls for quartile of average house prices and the range of other individual and family background characteristics outlined in Appendix Table A.3. Standard errors are clustered at school level and are shown in brackets. ** denotes statistical significance at the 5% level; *** denotes statistical significance at the 1% level. All regressions are weighted by a survey and non-response weight specific to the wave of the survey.

Table 3.2 continued

<i>Local labour market conditions (at UA/C level)</i>	<i>Binary outcome</i>								
	<i>In work, conditional on being in FTE</i>				<i>In work, conditional on not being in FTE</i>				
	<i>Age 16 (2006-07)</i>	<i>Age 17 (2007-08)</i>	<i>Age 18 (2008-09)</i>	<i>Age 16 (2006-07)</i>	<i>Age 17 (2007-08)</i>	<i>Age 18 (2008-09)</i>	<i>Age 16 (2006-07)</i>	<i>Age 17 (2007-08)</i>	<i>Age 18 (2008-09)</i>
<i>Reference level for those in the lowest quartile of wages</i>	0.555	0.584	0.370	0.705	0.801	0.743			
Median wages for 16- to 24-year-olds: quartile 2	0.011 [0.025]	0.010 [0.031]	0.036 [0.030]	-0.063 [0.039]	0.021 [0.028]	-0.047 [0.027]			
Median wages for 16- to 24-year-olds: quartile 3	0.008 [0.024]	-0.016 [0.031]	0.065 [0.033]	-0.029 [0.036]	-0.004 [0.029]	-0.018 [0.028]			
Median wages for 16- to 24-year-olds: highest quartile	-0.034 [0.033]	-0.076** [0.036]	-0.013 [0.041]	-0.037 [0.055]	-0.032 [0.035]	-0.016 [0.033]			
<i>Reference level for those in the lowest quartile of unemployment</i>	0.593	0.591	0.468	0.700	0.824	0.766			
Average unemployment for 16- to 24-year-olds: quartile 2	0.017 [0.026]	0.003 [0.034]	-0.015 [0.033]	-0.016 [0.044]	0.028 [0.025]	-0.005 [0.027]			
Average unemployment for 16- to 24-year-olds: quartile 3	-0.031 [0.026]	-0.029 [0.029]	-0.042 [0.034]	0.011 [0.038]	-0.048 [0.026]	-0.007 [0.029]			
Average unemployment for 16- to 24-year-olds: highest quartile	-0.085*** [0.028]	-0.096*** [0.029]	-0.061 [0.037]	0.016 [0.040]	-0.074** [0.029]	0.002 [0.031]			
<i>N</i>	8,582	5,821	4,850	2,532	4,169	4,495			
<i>R</i> ²	0.173	0.176	0.091	0.151	0.139	0.130			

Notes: All models include controls for quartile of average house prices and the range of other individual and family background characteristics outlined in Appendix Table A.3. Standard errors are clustered at school level and are shown in brackets. ** denotes statistical significance at the 5% level; *** denotes statistical significance at the 1% level. All regressions are weighted by a survey and non-response weight specific to the wave of the survey.

Local youth unemployment rates appear to make little difference to the education participation decisions of 16- or 17-year-olds though. These results appear to contradict those based on the descriptive analysis presented in Chapter 2 – which seemed to suggest that young people were responding to the recession by staying longer in full-time education than they otherwise would have done. This contradiction could arise because young people base their expectations about the returns to education on national rather than local labour market conditions. It could also simply be driven by the classic difference between time-series and cross-sectional analysis discussed in Section 3.1, i.e. that the descriptive (time-series) analysis is biased upwards by the omission of controls for individual characteristics.

As we would expect on the basis of these results, the youth unemployment rate also has an impact on the probability of dropping out of FTE at age 18, but not at age 17. The estimates are negative, statistically significant and of a similar magnitude to those reported above. The percentage point impact of living in an area with the highest level of unemployment relative to the lowest level of unemployment is equivalent to a decrease of 18% from the level in the reference area.

Local youth unemployment rates also seem to play a significant role in determining the probability of being in work amongst those in FTE (i.e. the probability that students decide to take on a part-time job), but generally not the probability of being in work amongst those who are not in FTE or the probability of being NEET. Specifically, those living in areas with the highest level of youth unemployment are less likely to combine work and education at all ages – though only significantly so at ages 16 and 17 – consistent with the theory of a lower return to job search. The suggestion that youth unemployment has a larger impact on this outcome at younger ages is perhaps unsurprising as the decision to work while in FTE at older ages is likely to be more marginal and to affect different individuals.

By comparing the predicted probability of continuing in education for those at different points in the ability distribution, De Coulon et al. (2010) found suggestive evidence that young people with lower academic ability (based on average GCSE scores) were more influenced by local labour market conditions than those with higher academic ability. We investigate the same issue here, but choose to use an earlier measure of academic ability (recorded at age 10/11) that is less likely to be affected by local labour market conditions (in other words, less likely to be endogenous to the decision to remain in FTE), for the reasons outlined in Section 3.3. We run four separate regressions for each quartile of the age 10/11 attainment distribution, using the same specification as that for the main results shown in Table 3.2.

In contrast to De Coulon et al. (2010), our results suggest that those with the lowest academic attainment are almost entirely unaffected by local labour market conditions, although there remains a significant positive impact of higher levels of youth unemployment on the probability of being in FTE at age 18 for those in the lowest quartile. Individuals in the third quartile appear to be most responsive to local labour market conditions and the results for individuals in this quartile mirror the overall findings discussed above, i.e. they suggest that the local youth unemployment rate has a strong and significant positive impact on the probability of being in FTE at age 18, and a strong and significant negative impact (of roughly the same magnitude) on the probability of dropping out of FTE at age 18. Local youth unemployment also significantly affects the probability that an individual combines work and education at ages 16 and 17, an effect that is not apparent for those in the lower quartiles of the distribution (but is true to a lesser extent for those in the highest ability quartile).³⁰

These results seem to suggest that those with the lowest and highest academic ability are relatively unaffected by local labour market conditions, but those in the middle of the distribution (whose decisions between work and continuing in education may be more marginal) are more likely to be influenced by what is happening in the local labour market. This result supports the prediction by Dickerson and Jones (2004) that the introduction of an NMW for young people would have little impact on post-compulsory schooling decisions, given the unequal distribution of ability in England's schools.

³⁰ Full results are available from the authors on request.

We also investigated whether our results differed by family income, but found no significant differences.³¹

Robustness checks

As discussed at the beginning of this chapter, young people are likely to be less mobile than older people, such that their potential labour market may be smaller than the UA/C level we use in our main analysis. To test whether young people may be more responsive to labour market conditions measured at a more local level, we compute measures of local wage and unemployment rates at the parliamentary constituency (PC) level. To do so, we have to make a trade-off: to ensure sufficient sample sizes in each parliamentary constituency, we are forced to compute wages and unemployment for adults aged 16–64, rather than youths aged 16–24. The local labour market measures we use for this analysis at PC level are therefore slightly less relevant for young people – although we are encouraged by the high degree of correlation between the 16–24 and 16–64 wage and unemployment rates at the UA/C level (see Appendix Table A.2 for full details).

We report the results of this exercise in Appendix Table A.5. Evidence from local labour market conditions measured at the PC level confirms that local wages appear to play very little role in determining the choices of young people in England. Local unemployment rates have a more consistently significant negative impact on the probability of combining work and FTE, but no impact on the probability of being in FTE or having left FTE at age 17 or 18. This could be because a wider local labour market is more appropriate for young people considering remaining in FTE at these ages. It could also be because the adult rate of unemployment does not explain the variation in the probability of remaining in FTE as well as the youth rate does, which seems plausible, particularly as results at the UA/C level using wage and unemployment rates for 16- to 64-year-olds rather than 16- to 24-year-olds suggest a similar story.³² The results at PC level also provide some evidence of positive and significant effects of local youth unemployment rates on the probability of being NEET at ages 17 and 18, and negative and significant effects on the likelihood of being in work amongst those not in FTE at the same ages.

In summary, our results show no evidence that the local wage rate for young people has a significant impact on the education or labour market choices made by young people. In terms of the implications of these results for any future changes to the 16- to 17-year-old or development rates of the national minimum wage, this suggests that most young people’s decisions are unlikely to be directly influenced by any changes to potential wages that may be induced by adjustments to the NMW rates. The local unemployment rate seems to have more influence on young people’s decisions, however. This suggests that the NMW may affect young people’s education and labour market choices indirectly if it affects the level of youth unemployment. Specifically, our results suggest that high youth unemployment has a positive impact on the probability that young people are in FTE at age 18 and a negative impact on the probability that they decide to leave FTE at the same age (a complementary result). There is also some evidence that high levels of youth unemployment reduce the probability that young people are in work, especially amongst those in FTE, whose decision is likely to be more marginal.

3.5 Summary

Using data relevant to a recent cohort of young people, our results suggest that the education and labour market choices made between the ages of 16 and 18 are not significantly influenced by variation in local youth wage rates. This suggests that changes in the 16- to 17-year-old or development rates of the NMW are unlikely to have a direct impact on the main activities young people choose to undertake, which is confirmed by a robustness check using variation at a smaller geographical level.

³¹ Results are available from the authors on request.

³² Full results of this specification are available from the authors on request.

By contrast, we show that the local level of youth unemployment has a significant impact on the decisions of young people at some ages, in line with previous research. A higher level of youth unemployment in the local area increases the probability that a young person remains in FTE (or does not drop out of FTE) at age 18, although not at younger ages. The level of youth unemployment also has an impact on the probability that young people work whilst in FTE, perhaps reflecting the lack of availability of part-time work for young people in areas of high unemployment. As a result, if changes to NMW rates affect the level of unemployment, they may, indirectly at least, affect the education and labour market choices of young people, even though the direct effect of the minimum wage on their decisions appears extremely limited.

In summary, our results confirm findings from previous work commissioned by the LPC and elsewhere that a young person's academic ability and family background are the main determinants of the education participation decision, while the role of local labour market conditions is more limited.

4 Impact of the 16- to 17-year-old rate of the national minimum wage on education and labour market choices of 16- to 17-year-olds

On 1 October 2004, the national minimum wage (NMW) was extended to cover 16- and 17-year-olds in the UK, at a lower rate than for workers aged 18 and above. Early studies funded by the LPC (Frayne and Goodman, 2004; Dickerson and Jones, 2004) used theoretical models to simulate the impact of such a rate on the education and labour market choices of 16- to 17-year-olds. Both suggested that the impact of a rate below £4 per hour on education participation decisions was likely to be insignificant. As actual data on young people's choices since the introduction of the 16- to 17-year-old rate became available, De Coulon et al. (2010) evaluated the impact of this rate on post-compulsory education participation rates among 16- to 17-year-olds. Using a difference-in-differences approach exploiting variation in the 'bite' of the 16- to 17-year-old rate at the local authority level, they found little impact of the introduction of the rate on young people's education participation decisions.

We build on the analysis of De Coulon et al. in this chapter, but our approach differs from theirs in two key ways:

- Our estimation is at the individual level rather than the area level. This enables us to control for individual characteristics, which allows us to capture changes in the composition of individuals across areas over time, as well as to increase the precision of our estimates.³³
- We look at a range of education and labour market outcomes for young people, rather than a simple binary indicator of education participation, including:
 - whether they are in full-time education (FTE);
 - whether they are NEET (not in education, employment or training);
 - whether they are in work, given that they are in FTE;
 - whether they are in work, given that they are *not* in FTE.

As outlined in the introduction, the 16- to 17-year-old rate of the NMW has theoretically ambiguous effects on all of the outcomes we consider; its impact on young people's education and labour market outcomes is thus an empirical question, which we consider here.

The remainder of this chapter now proceeds as follows. Sections 4.1 and 4.2 respectively outline the methodology that we adopt and the data that we use. Section 4.3 presents our main results, while Section 4.4 describes the results of a series of robustness checks on these results. Section 4.5 summarises our findings of the impact of the 16- to 17-year-old rate of the NMW on young people's education and labour market choices.

³³ In principle, difference-in-differences estimation at an aggregated level is equivalent to difference-in-differences at the individual level without any controls, so long as it is properly weighted. However, such a simple model might give biased estimates if some omitted characteristic varies over time differentially in treatment and control areas and causes differences in the outcome. For example, if the proportion of ethnic minorities increased significantly in treatment relative to control areas after the introduction of the minimum wage and if ethnic minorities have an inherently higher preference for education, then that could increase the participation rates in treatment relative to control areas, and it would be a mistake to interpret this increase as the impact of the 16- to 17-year-old rate. Hence, we control for individual characteristics such as ethnicity, gender, prior attainment and family background.

4.1 Methodology

Following De Coulon et al. (2010), we use regional variation in wage rates to identify the impact of the 16- to 17-year-old rate of the NMW on the education and labour market outcomes of young people aged 16–17 using a difference-in-differences approach. Specifically, we take advantage of the fact that the introduction of this rate is more likely to ‘bite’ in some regions than others: it is more likely to lead to a wage increase for individuals living/working in initially low-wage areas than for those living/working in initially high-wage areas. Thus, we might expect any impact of the 16- to 17-year-old rate on participation and employment to be greater in low-wage than high-wage areas. Like De Coulon et al., we therefore define a treatment group consisting of individuals living in low-wage areas and a control group consisting of individuals living in high-wage areas, and we identify the impact of the 16- to 17-year-old rate by subtracting the change in outcomes over time amongst individuals in the control group from the change in outcomes over time amongst individuals in the treatment group. We discuss in Section 4.2 exactly how we define our treatment and control groups.

Our basic difference-in-differences estimation takes the following form:

$$Y_{it} = \alpha + \beta_1 \times after_t + \beta_2 \times treat_i + \delta_1 \times treat_i \times after_t + \gamma X_{it} + \varepsilon_{it}$$

where: Y_{it} is the outcome of interest, such as whether individual i is in full-time education at time t ; $after_t$ is a binary variable equal to 1 after the introduction of the 16- to 17-year-old rate (so from 2004Q4) and 0 otherwise; $treat_i$ is a binary variable equal to 1 for individuals in low-wage areas and 0 for those in high-wage areas; $treat_i \times after_t$ is a binary variable equal to 1 for individuals in low-wage areas from 2004Q4 onwards and 0 otherwise; X_{it} is a vector of individual characteristics such as gender and ethnicity (the full list can be found in the Notes to Table 4.3); and ε_{it} is the error term.

The key parameter of interest is δ_1 , as it represents the impact of the policy on 16- to 17-year-olds living in a treatment (initially low-wage) area *relative to those living in a high-wage area*.³⁴ For this interpretation to be valid, it must be the case that in the absence of the policy, the change in outcomes over the relevant period would have been the same for the treatment and control groups, conditional on all other factors. This is known as the common trends assumption. This assumption is, of course, impossible to test, but a comparison of the trend in outcomes for the two groups prior to the policy change is often used as a reasonable guide to how valid the assumption may be.

We therefore check whether trends in treatment and control areas were different in the 24 months prior to the policy change, from October 2002 to September 2004. Specifically, we test the hypothesis that the difference in each outcome between treatment and control areas stayed constant throughout the 24 months before October 2004.³⁵ This hypothesis is not rejected at the 10% significance level for any of the four outcomes examined for either England alone or the whole of Great Britain, using local wages measured at the 10th, 15th or 20th percentile to define our treatment and control areas (see Table 4.1). If the 25th percentile is used instead, the plausibility of the common trends assumption holds for all outcomes except for the young person being ‘in work, conditional on being in full-time education’ in Great Britain.

Overall, there is evidence to support the common trends hypothesis in the vast majority of cases, which gives us confidence in our main results, which we present below.

³⁴ If one is willing to accept a further assumption that the 16- to 17-year-old rate had no impact in high-wage areas, then δ_1 can be interpreted as the average policy impact on 16- to 17-year-olds in low-wage areas.

³⁵ We do this for each outcome by regressing the outcome of interest (using ordinary least squares) on interactions of the treatment dummy with time dummies, while controlling for individual characteristics such as gender and ethnicity.

Table 4.1 P-values of the hypothesis that the difference in outcomes between treatment and control areas was constant from October 2002 to September 2004

Local wage measured at which percentile:	10 th	15 th	20 th	25 th
Great Britain				
FTE	0.874	0.513	0.261	0.281
Work conditional on FTE	0.234	0.134	0.159	0.085
NEET	0.706	0.861	0.588	0.718
Work conditional on not in FTE	0.960	0.959	0.797	0.976
England only				
FTE	0.266	0.418	0.172	0.361
Work conditional on FTE	0.453	0.179	0.265	0.254
NEET	0.314	0.567	0.594	0.724
Work conditional on not in FTE	0.786	0.888	0.894	0.918

Notes: The sample period runs from October 2002 to September 2004. Self-employed individuals and unpaid family workers are excluded in regressions of outcomes other than FTE and NEET. The right-hand side includes a treatment dummy, 23 monthly dummies, 23 interactions between the treatment dummy and the monthly dummies, and a set of controls as listed in the Notes to Table 4.3. The tested hypothesis is whether all the interactions between the treatment dummy and monthly dummies are jointly insignificant. The figures in the table should be interpreted as the probability of rejecting the null hypothesis, in which a value greater than 0.1 means that we cannot reject it at the 10% significance level.

One possible confounding factor here is the introduction of the Education Maintenance Allowance (EMA) in September 2004, which was found to have a positive impact on post-compulsory education participation (Dearden et al., 2009). The difference-in-differences interpretation described above remains valid only if the impact of EMA is uncorrelated with the level of youth wages in the local area, since the impact of EMA will be subsumed into the time effects. If the impact of EMA is correlated with the level of local youth wages, however, then our difference-in-differences estimate must be interpreted as the combined impact of EMA and the 16- to 17-year-old rate in low-wage areas relative to high-wage ones. We might expect the impact of EMA to be correlated with the level of wages in the area for at least three reasons: (a) the real value of the EMA is higher in areas with low prices, and these areas also tend to have lower wages;³⁶ (b) it is possible that EMA has a larger impact in areas with limited job opportunities; (c) take-up of EMA may be higher in low-wage areas, because such areas have proportionately more low-income families. As previous studies have found a positive impact of EMA on education participation, a negative correlation between the EMA effect and the local wage would bias upwards our estimate of the impact of the 16- to 17-year-old rate on education participation. We return to this point in the discussion of our results below.

In addition to our main difference-in-differences specification, we explore two further specifications. First, we use observations in mid-wage areas as an additional treatment group. The idea is that the 16- to 17-year-old rate might have some impact on young people where local wages are moderate, compared with where local wages are high. We would expect this treatment impact to be smaller than the impact on individuals in low-wage areas relative to high-wage ones, and hence one can view this specification as providing a robustness check for the results from low-wage areas. In terms of regression specification, we simply add a dummy for the mid-wage areas (*midwage_i*) and an interaction term between it and the *after* dummy:

$$Y_{it} = \alpha + \beta_1 \times \text{after}_t + \beta_2 \times \text{treat}_i + \beta_3 \times \text{midwage}_i + \delta_1 \times \text{treat}_i \times \text{after}_t + \delta_2 \times \text{midwage}_i \times \text{after}_t + \gamma \mathbf{X}_{it} + \varepsilon_{it}.$$

The parameter δ_2 captures the policy impact on individuals in mid-wage areas relative to those in high-wage ones. The essential assumption here is a simple extension of the common trends assumption outlined above for low-wage areas, i.e. that in the absence of the policy, an individual in a mid-wage area

³⁶ The correlation between house prices and median wages for 16- to 21-year-olds in 2006 is 0.53, which is significant at the 5% level (see Appendix Table A.2).

would be expected to experience the same change in outcomes as someone in a high-wage area, all else being equal.

Second, we experiment with the hypothesis that the impact of the 16- to 17-year-old rate is a continuous function of the local wage. This allows the impact of this rate to change smoothly with the local wage rate. This approach has the advantage that we use the maximum amount of data available, but we are perhaps less likely to detect a significant effect, because we are comparing areas that are more similar. Instead of dummies for low-wage and mid-wage areas relative to high-wage ones, we now include a quadratic polynomial of the local wage rate and interact this polynomial with the *after* dummy. The model takes the following form:

$$Y_{it} = \alpha + \beta_1 \times \text{after}_t + \beta_2 \times \text{localwage}_i + \beta_3 \times \text{localwage}_i^2 + \theta_1 \times \text{localwage}_i \times \text{after}_t + \theta_2 \times \text{localwage}_i^2 \times \text{after}_t + \gamma X_{it} + \varepsilon_{it}$$

Here, *localwage_i* is the 10th percentile of the 16–21 wage distribution in the local area (see the discussion in Section 4.2 for why we choose to use this measure). θ_1 and θ_2 capture how the impact of the policy changes continuously as the local wage changes. It is assumed that in the absence of the policy, the change in outcomes over the relevant period would be uncorrelated with the local wage. When testing for policy effects, the null hypothesis would be that both θ_1 and θ_2 equal zero.

Our outcome variables of interest are binary. In our main analysis, we estimate the impact of the 16- to 17-year-old rate of the NMW using a linear probability model (LPM). The LPM has the advantage that the estimated coefficients have a straightforward interpretation, but the disadvantage that the model can yield nonsensical predictions (i.e. predicted probabilities outside the range of 0 to 1). We check the robustness of our main findings by running the same regressions using a probit model. Probit models overcome the problem of unbounded predictions and also allow characteristics to have a non-linear effect on the probability of a positive outcome. As can be seen from Tables 4.3–4.5 and Appendix Table B.1, the results from the two models tell very similar stories.

4.2 Data

For the analysis in this chapter, we use a sample of 16- to 17-year-olds from the Labour Force Survey (LFS). As our outcomes of interest relate to post-compulsory education and labour market choices, our sample excludes 16-year-olds who are still in compulsory education at the time of the survey. Our sample period runs from 2002Q4 to 2004Q3 (the ‘before’ period) and from 2004Q4 to 2006Q3 (the ‘after’ period). In total, our sample includes 38,590 observations for 17,832 different individuals.

To construct our local wage measure, we use data from the Annual Survey of Hours and Earnings (ASHE). In order to obtain a large enough number of observations in the period immediately before the policy was introduced, we combine five years of data, from 1999 to 2003, after adjusting them for inflation using the retail price index (RPI) so that all prices are comparable to those in 2004.

We use the 141 unitary authorities / counties (UA/C) in Great Britain (minus two small ones in Scotland), but split London into its 32 constituent boroughs, giving a total of 170 local areas. This gives us at least 50 valid wage observations among 16- to 21-year-olds in all areas apart from 12 (where the average number of observations is 32). We choose to use the wages for young people aged 16–21 rather than 16–17 to provide a reasonable number of observations per area (as did De Coulon et al. (2010), for the same reason), thus ensuring that our classification of treatment and control areas is robust. In practice, the wages of 16- to 21-year-olds are positively correlated with those of 16- to 17-year-olds.³⁷ The median number of observations per local area when using 16- to 21-year-olds is around 150.

³⁷ Across the 170 local areas, the correlation between our local wage measure (the 10th percentile of the 16–21 wage distribution) and the corresponding measure for 16- to 17-year-olds (the 10th percentile of the 16–17 distribution), weighted by the number of 16- to 17-year-old observations, is 0.76.

A finer geography, such as parliamentary constituencies, would mean fewer observations in some areas, which would lead to too much noise in the definition of treatment and control groups. A more aggregated geography, such as government office regions, would ensure adequate sample sizes within each region, but would not capture the smaller local labour markets that are likely to be most relevant to young people, who tend to be less mobile than adults. Our choice of local area is designed to balance these two considerations.

For our main analysis (presented in Section 4.3), we define the local wage rate as the 10th percentile of the observed wage distribution among 16- to 21-year-olds at the UA/C level. The choice of the 10th percentile is driven by the fact that it is closest to the level at which the 16- to 17-year-old rate was introduced, but is again largely a matter of judgement. Choosing a lower percentile in the 16–21 wage distribution would mean higher sensitivity to a small number of low-paid young people, especially in small areas, while a higher percentile would capture those who are less likely to have been affected by the introduction of the 16- to 17-year-old rate. The 10th percentile wage measure also creates treatment and control groups that appear to satisfy the assumption of common trends better than other percentiles, providing a further justification for our choice.

We rank all areas by this local wage measure, and define our treatment and control areas (from the bottom and top of this ranking respectively) such that they each contain approximately 30% of the total population of 16- to 17-year-olds in Great Britain. This choice involves another trade-off: a higher percentage of young people in each group would increase the sample size for our regressions, but it would also attenuate the policy impact that might be found because we would be comparing two groups that are more similar on average. By the same logic, further restricting the size of each group to 20% or even 10% would give us more distinct areas, but at the price of a smaller sample size and less precise estimates. Given that some of our outcomes are only applicable to subgroups of the youth population (such as whether one is working conditional on being in FTE), the sample size will matter. We believe that 30% strikes the right balance between sample size and attenuation, but we provide robustness checks in Section 4.4 by repeating the main analysis including the top/bottom 40%, 20% and 10% of young people in initially high-/low-wage areas.³⁸ In each case, mid-wage areas are those not classified as either high- or low-wage areas, so will cover 40% of the population when we include 30% in each of our treatment and control groups, and 80% of the population when we only include 10% in each of our treatment and control groups.

Measured at the 10th percentile of the local 16–21 wage distribution, local wages before 2004 ranged from £2.86 to £4.79 per hour in 2004 prices. The majority of the sample (the middle eight decile groups) have a local wage between £3.50 and £4.05 per hour. Table 4.2 provides some summary statistics of the local wage measure in our sample by treatment and control groups.

Table 4.2 Summary statistics of the local wage (£ per hour in 2004 prices)

	Treatment group	Control group	All individuals
Median	3.52	3.95	3.71
Mean	3.51	4.00	3.73
Standard deviation	0.115	0.188	0.231

Notes: The summary statistics are based on the entire sample period 2002Q4–2006Q3. The local wage measure is the 10th percentile of the local 16–21 wage distribution in 1999–2003, so the median in the table is the median of the 10th percentile weighted by the number of observations in each area.

³⁸ Appendix Table B.2 provides an ordered list of all the UA/Cs in Great Britain.

4.3 Main results

Tables 4.3 to 4.5 report our main findings of the impact of the 16–17 rate of the NMW on the education and labour market choices of 16- to 17-year-olds. Table 4.3 reports the difference-in-differences estimates of the policy impact on a range of outcomes from a linear probability model. The first column relates to whether individuals were in full-time education; the second relates to whether they were NEET; and the last two columns relate to whether individuals were in work or not for, respectively, all those in FTE and all those not in FTE.

Table 4.3 Difference-in-differences estimates of the impact of the 16- to 17-year-old rate in low-wage areas relative to high-wage areas

Outcome:	FTE	NEET	Work if in FTE	Work if not in FTE
Low-wage×after	0.011 [0.016]	-0.0005 [0.009]	0.041** [0.020]	0.022 [0.031]
Sample size	23,317	23,317	16,499	6,660

Notes: Standard errors are clustered at the individual level and shown in brackets. *** indicates statistical significance at the 1% level, ** at the 5% level and * at the 10% level. The model is specified in Section 4.1. ‘Low-wage’ is the dummy for low-wage areas (ranked according to the 10th percentile of the 16–21 pay distribution in the area). The ‘after’ dummy = 0 for 2002Q4–2004Q3 and = 1 for 2004Q4–2006Q3. This table presents coefficients on the interaction between the ‘low-wage’ and ‘after’ dummies. Self-employed individuals and unpaid family workers are excluded in regressions of outcomes other than FTE and NEET. Controls include gender, ethnicity, age measured in months, whether academic age was 16 or 17, highest level of qualification, whether achieved at least five GCSEs at grades A*–C, yearly and monthly dummies, and parents’ employment status, income quartile and qualification levels.

The estimates from the first model indicate that the introduction of the 16- to 17-year-old rate of the NMW actually *increased* the probability of participating in full-time education by 1.1 percentage points in low-wage areas relative to high-wage areas, all else being equal, although this estimate is not statistically significantly different from zero. Of course, we must remember that if the impact of the EMA was also greater in low-wage than in high-wage areas, then this estimate is likely to be an upper bound of the effect of the 16- to 17-year-old rate on post-compulsory education participation.

Similarly, the final column suggests that the introduction of the 16- to 17-year-old rate had a positive but insignificant effect on the probability of being in work amongst young people who were not in FTE, while the second column suggests that its effect on the likelihood of being NEET was close to zero. The lack of significance for these three outcomes is supported by the results from the probit model (reported in the top panel of Appendix Table B.1).

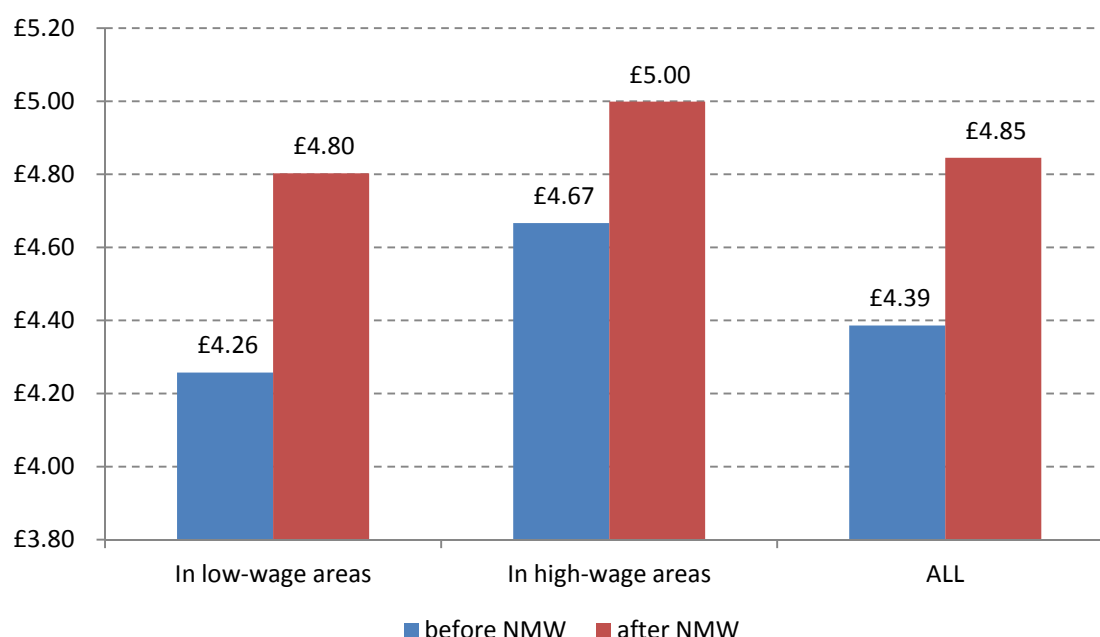
However, the 16- to 17-year-old rate appears to have a positive and significant effect on the probability of working among full-time students in low-wage areas. The results suggest that individuals in full-time education in low-wage areas are 4.1 percentage points (10%) more likely to be in work as a result of the introduction of the 16- to 17-year-old rate than those in high-wage areas, and this estimate is significant at the 5% level.³⁹ This result is perhaps unsurprising, given that deciding whether or not to take a part-time job whilst studying might be thought of as a more marginal decision than the decision to leave FTE entirely. The sign of the estimated impact is consistent with the idea that the 16- to 17-year-old rate encouraged full-time students to look for and take part-time jobs and further that the rate did not reduce the demand for such workers very much.⁴⁰

³⁹ The corresponding probit estimate (reported in Appendix Table B.1) is only significant at the 10% level, but is slightly larger in magnitude, at 4.3 percentage points.

⁴⁰ Those who continue into post-compulsory education tend to have higher ability than those who drop out. Thus, if the 16- to 17-year-old rate were to reduce demand for young workers, one would expect this negative impact to be smaller for students than for non-students (given that they are likely to have higher ability).

This potential explanation is supported by the observation of a big increase in wages among young workers who are also in full-time education. For this group, the average hourly wage increased from £4.39 in the two years before the introduction of the 16- to 17-year-old rate to £4.85 in the two years following the change. This was much greater than the average wage increase (from £3.99 to £4.16) for young workers who were not in full-time education.⁴¹ Amongst those in full-time education and work, it is clear that the wage increase was also much greater in initially low-wage areas than in initially high-wage areas (see Figure 4.1). This suggests that the 16- to 17-year-old rate had a greater impact on wages amongst full-time students in initially low-wage areas than in initially high-wage areas; thus it is unsurprising that our difference-in-differences estimates suggest that the introduction of the 16- to 17-year-old rate of the NMW had a positive effect on youth employment while in full-time education in those areas.

Figure 4.1 Average wages of 16- to 17-year-old workers who are also in full-time education in high- and low-wage areas



Source: Authors' calculations based on Labour Force Survey 2002Q4 to 2006Q3. The period 'before NMW' refers to 2002Q4–2004Q3; the period 'after NMW' refers to 2004Q4–2006Q3.

Table 4.4 Difference-in-differences estimates of the impact of the 16- to 17-year-old rate in low-wage and mid-wage areas relative to high-wage areas

Outcome:	FTE	NEET	Work if in FTE	Work if not in FTE
Low-wage×after	0.012 [0.016]	-0.0003 [0.009]	0.041** [0.020]	0.020 [0.031]
Mid-wage×after	-0.023 [0.015]	0.002 [0.009]	0.0005 [0.020]	0.038 [0.030]
Sample size	36,686	36,686	25,631	10,801

Notes: Same as for Table 4.3. The dummy 'mid-wage' = 1 in mid-wage areas and 0 otherwise; we focus on its interaction with the 'after' dummy.

⁴¹ Based on the smaller increase in the average wage among those not in FTE, it is not surprising that the effect of the NMW on employment among non-students is smaller than that among full-time students (see Table 4.3).

Table 4.4 reports the results from our second regression specification, which extends the difference-in-differences approach to consider two distinct treatment groups – low-wage areas and mid-wage areas – relative to high-wage areas.

The results for low-wage areas are broadly similar to those in Table 4.3, confirming the finding of a statistically insignificant effect of the 16- to 17-year-old rate on the probability of being in full-time education, the probability of working conditional on not being in FTE and the probability of being NEET, and a statistically significant effect of around 4 percentage points on the probability of working conditional on being in FTE relative to high-wage areas. The difference between mid-wage and high-wage areas in terms of this latter outcome is insignificant and close to zero, however, suggesting that the introduction of the 16- to 17-year-old rate only had an impact on young people living in low-wage, not mid-wage, areas.

Our final regression specification allows the impact of the 16- to 17-year-old rate to vary continuously with the initial local wage in a non-linear way. For all four outcomes, the two interaction terms (the ‘after’ dummy with the local wage and with the square of local wage) are jointly insignificant at the 10% level. To provide some sense of the magnitude of the impact, we calculate the difference in policy effects between two points of the local wage: £3.25 per hour (about the 1st percentile in the sample) and £4.00 per hour (about the 95th percentile in the sample).⁴² As shown in Table 4.5, all differences in the predicted probabilities arising from this change are statistically insignificant except for the probability of being in work conditional on being in FTE. Specifically, the policy impact is estimated to be 6 percentage points higher in extremely low-wage areas than in very high-wage areas, and this difference is significant at the 10% level. If one is willing to accept the assumption that the 16- to 17-year-old rate had zero impact in extremely high-wage areas, then this result can be interpreted as a large and significant positive effect of the 16- to 17-year-old rate of the NMW on whether full-time students work part-time alongside their studies in very low-wage areas, confirming the findings in our previous specifications.

Table 4.5 Estimated impact of the 16- to 17-year-old rate using a continuous measure of local wages

Outcome:	FTE	NEET	Work if in FTE	Work if not in FTE
Localwage×after	-0.553 [0.450]	0.059 [0.313]	-0.763 [0.528]	0.222 [0.800]
Localwage ² ×after	0.071 [0.059]	-0.010 [0.041]	0.094 [0.069]	-0.033 [0.105]
P-value for joint significance	0.429	0.678	0.199	0.810
Sample size	36,686	36,686	25,631	10,801
Difference in policy impact at £3.25 relative to £4.00	0.032	0.008	0.061	0.013
Corresponding p-value	0.237	0.642	0.074	0.783

Notes: Same as for Table 4.3. Instead of a dummy for the low-wage areas, the local wage measure and its square are included on the right-hand side, and they are both interacted with the ‘after’ dummy. In each regression, we test the joint significance of the two interaction terms and report the p-value. We also calculate the difference in the policy effects between two points of local wage (£3.25 and £4.00), and test whether it is significantly different from zero, again reporting the p-value.

⁴² The difference in policy effects between two points of local wages, w_1 and w_2 , is simply $\theta_1(w_1 - w_2) + \theta_2(w_1^2 - w_2^2)$. So each of the figures reported in the penultimate row of Table 4.5 equals $\theta_1(3.25 - 4) + \theta_2(3.25^2 - 16)$, where θ_1 and θ_2 are the coefficient estimates reported in the corresponding column.

We also use our main regression specification to investigate whether the impact of the 16- to 17-year-old rate varies amongst particular subgroups of interest, including by gender, qualifications and parents' work status. Table 4.6 shows how the impact of the 16- to 17-year-old rate on the likelihood of working conditional on being in FTE varies by subgroup.⁴³

Table 4.6 shows that the introduction of the 16- to 17-year-old rate is estimated to have significantly increased the likelihood of being in work by 6 percentage points among female students, but only led to an insignificant increase of 2.1 percentage points for males. More interestingly, the policy impact appears to be stronger for those of higher ability and for those from families in which at least one parent works, and is close to zero for those of lower ability and for those from workless households.

Table 4.6 Impact on working conditional on being in FTE, by various subgroups of interest

Subgroups:	All	Females	Males	Have at least 5 GCSEs	Don't have at least 5 GCSEs
Estimated impact	0.041** [0.020]	0.060** [0.028]	0.021 [0.029]	0.048* [0.025]	0.017 [0.033]
Sample size	16,499	8,799	7,700	11,873	4,626

Continued ...

Subgroups:		No parents in employment	At least one parent in employment	Mother absent or out of work	Mother in work
Estimated impact		-0.020 [0.041]	0.072*** [0.028]	0.006 [0.033]	0.052** [0.025]
Sample size		2,675	9,442	5,014	11,485

Notes: Same as for Table 4.3, except that the sample is defined by the corresponding heading. When we split the sample of young people according to whether their parents are in employment or not, we do so on the basis of whether at least one parent reports positive employment earnings. Parents who are self-employed or employed but do not report earnings information for some reason are omitted from these categorisations.

For example, the impact of the 16- to 17-year-old rate on the likelihood of being in work amongst those in full-time education is 4.8 percentage points for young people with at least five GCSE passes (at grades A*-G), but this rate has no effect on those who hold only lower qualifications. Similarly, the impact is 7.2 percentage points amongst those with positive parental earnings and negative (but insignificant) amongst those in workless households. Intuitively, young people with working parents may have a greater preference for work and find it easier to obtain part-time jobs than those from workless families, thus helping to explain why they might be more responsive to an increase in the expected wage than young people from workless families.

To the extent that part-time work experience benefits the students who undertake it (in terms of future employability and productivity), the introduction of the 16- to 17-year-old rate appears to have improved social welfare. However, if there is substitution of job opportunities away from low-ability youths from workless households towards more-able youths from families in which at least one parent works, then the distributional consequences of the 16- to 17-year-old rate may be undesirable. Fortunately, for the period we have considered, there does not appear to have been a significant negative impact on the

⁴³ Appendix Table B.3 presents the results for our other main outcomes of interest, as well as some additional subgroups. These results broadly confirm the finding that the 16- to 17-year old rate had little impact on any of these other outcomes, with one exception: among young people whose father is absent and who themselves are out of full-time education, the 16- to 17-year-old rate is estimated to increase the likelihood of being in work by about 11 percentage points, an estimate that is significant at the 5% level.

probability of being in work amongst individuals from disadvantaged backgrounds.⁴⁴ In other words, the policy appears to have benefited some youths with no significant adverse effects on others.

4.4 Robustness checks

In this section, we check how robust our findings are to our chosen definition of local wages, sample period and the inclusion/exclusion of Wales and Scotland (in which education is a devolved issue). We do so by comparing the difference-in-differences estimates of the policy impact under different assumptions and sample choices. Tables 4.7 to 4.9 report the results of these robustness checks for the outcome ‘work conditional on full-time education’, since this is the only outcome for which we have found a significant policy impact in our main results. The robustness checks for the other outcomes can be found in Appendix Tables B.4 and B.5, which broadly confirm that the introduction of the 16- to 17-year-old rate did not significantly affect any of these outcomes.

In addition, we check the sensitivity of our difference-in-differences estimates to the size of the treatment and control groups for all four outcomes. These results are presented in Table 4.10. While we have not found any significant impacts for outcomes other than ‘work conditional on FTE’ using treatment and control groups that each cover 30% of the 16- to 17-year-old population, it is theoretically possible that comparing two smaller, more dissimilar groups would produce different policy effects.

Table 4.7 illustrates how the difference-in-differences estimates change if a different sample period is used (our main results use eight quarters before and eight quarters after the introduction of the 16- to 17-year-old rate in October 2004). All four specifications in the upper panel – which variously shorten the before and after periods to four quarters rather than eight – point to a positive impact of the 16- to 17-year-old rate of the NMW on the probability of being in work conditional on being in FTE (although not all estimates are significantly different from zero). In both regressions that include eight quarters before the policy change, the estimates are statistically different from zero at the 5% significance level. The estimates using a shorter pre-policy period are smaller and less precise.

Table 4.7 Impact on working conditional on being in FTE, using different sample periods

Sample period:	Baseline estimate (2002Q4–2006Q3; 8 quarters before and after)	Before: 2002Q4–2004Q3 After: 2004Q4–2005Q3	Before: 2003Q4–2004Q3 After: 2004Q4–2005Q3	Before: 2003Q4–2004Q3 After: 2004Q4–2006Q3
Estimated impact	0.041** [0.020]	0.057** [0.024]	0.024 [0.027]	0.006 [0.024]
Sample size	16,499	12,314	8,129	12,314

Excluding anticipation period

Sample period:	Baseline estimate (Before: 2002Q4–2004Q3 After: 2004Q4–2006Q3)	Before: 2002Q4–2003Q3 After: 2004Q4–2006Q3	Before: 2002Q4–2004Q1 After: 2004Q4–2006Q3	Before: 2002Q4–2004Q1 After: 2004Q4–2006Q1
Estimated impact	0.041** [0.020]	0.073*** [0.025]	0.048** [0.022]	0.052** [0.023]
Sample size	16,499	12,582	14,739	12,907

Notes: Same as for Table 4.3, except that the sample periods are as indicated in the column headings.

⁴⁴ This can result from very weak displacement effects, or from a combination of displacement effects and a positive effect on labour supply.

It is possible that there were some anticipation effects in the quarters immediately before the policy change (especially 2004Q2 and 2004Q3, as the policy was announced in March 2004), and that such effects lead to a greater downward bias in the difference-in-differences estimate when the pre-policy period includes only four quarters immediately before the policy change. To avoid these potential anticipation effects, we further experiment with sample periods that exclude 2004Q2 and 2004Q3 (and some other quarters as well). In the lower panel of Table 4.7, we report the difference-in-differences estimates from three sample periods, all with an earlier pre-policy period. All three specifications lead to bigger estimates of the policy impact than our baseline estimate that are significant at the 5% level (indeed, one is significant at the 1% level), providing some evidence to support the existence of anticipation effects in 2004Q2 and 2004Q3. Nonetheless, our conclusion from this analysis is that the finding of a positive impact of the 16- to 17-year-old rate on the likelihood of being in work amongst those in FTE is reasonably robust to the length and specification of sample period used.

Table 4.8 illustrates how our estimates change if an alternative percentile of the local wage distribution is used to classify control and treatment groups (our main results use the 10th percentile).⁴⁵ All four measures of local wages suggest a positive policy impact in low-wage areas relative to high-wage ones, although not all are significantly different from zero. These results do not undermine our decision to use the 10th percentile of the wage distribution as being closest to the level at which the 16- to 17-year-old rate was introduced, and we are reassured by the fact that we find a positive impact of the 16- to 17-year-old rate of the NMW on whether young people choose to combine FTE and work, regardless of our choice of percentile, although whether the estimate is significantly different from zero varies by specification.

Table 4.8 Impact on working conditional on being in FTE, varying the percentile of the wage distribution used to define our treatment and control groups

Percentile of local wage:	Baseline estimate (10 th percentile)	15 th	20 th	25 th
Estimated impact	0.041** [0.020]	0.029 [0.021]	0.035* [0.021]	0.028 [0.020]
Sample size	16,499	16,312	16,162	16,348

Notes: Same as for Table 4.3, except that the local wage is defined by the corresponding percentile instead of the 10th.

Next, we restrict our sample to England only, both to make the estimates more comparable to those discussed in Chapter 3 and to avoid the situation in which most treatment areas are in Wales and Scotland and most control areas are in England, with the two groups experiencing different education systems.⁴⁶ Table 4.9 shows that there is also a positive impact of the 16- to 17-year-old rate on the probability that young people combine FTE and work when we restrict our sample to those in England; moreover, this effect is almost identical in magnitude to that from our main specification (but only significant at the 10% level).

Table 4.9 Impact on working conditional on being in FTE, for England only or for Great Britain

	Baseline estimate (Great Britain)	England
Estimated impact	0.041** [0.020]	0.040* [0.023]
Sample size	16,499	13,701

Notes: Same as for Table 4.3, except that the second regression excludes observations outside England and the definitions of low-wage and high-wage areas are based on the ranking of the 10th percentile local wage within England.

⁴⁵ A full list of the areas included in our treatment and control groups in each case is available from the authors on request.

⁴⁶ Again, a full list of the areas included in our treatment and control groups in each case is available from the authors on request.

Finally, we alter the definitions of our treatment and control groups to each cover either 40%, 20% or 10% of young people (our main specification covered 30%). An ordered list of all the UA/Cs in Great Britain can be found in Appendix Table B.2.

The first and last few rows of Table 4.10 suggest that the impacts of the 16- to 17-year-old rate of the NMW on participation in post-compulsory education and on the probability of becoming NEET are small and insignificant regardless of the size of the treatment and control groups used. By contrast, the impact of the 16- to 17-year-old rate on the likelihood of being in work amongst full-time students remains positive across all specifications, although it is not always significant. While it is insignificant in most specifications, it is interesting to note that the impact of the 16- to 17-year-old rate of the NMW on the likelihood of being in work conditional on not being in FTE is large, positive and statistically significant at the 5% level based on a comparison of treatment and control groups containing only 10% of young people. It is possible that the impact of the 16- to 17-year-old rate on employment amongst non-students is strongly positive in extremely low-wage areas and weaker in areas with only moderately low wages. This would confirm the findings of Dickens, Riley and Wilkinson (2010), for example, who found a strong positive effect of eligibility for the adult rate of the NMW on the likelihood of being in work. But we do not wish to place too much emphasis on this result.

Table 4.10 Impact on a range of outcomes, by size of treatment and control groups

Size of treatment group relative to entire sample:	40%	Baseline estimate (30%)	20%	10%
Full-time education	0.010 [0.014]	0.011 [0.016]	0.016 [0.019]	0.025 [0.027]
Sample size	29,849	23,317	14,650	7,644
Work if in FTE	0.027 [0.018]	0.041** [0.020]	0.033 [0.026]	0.024 [0.035]
Sample size	20,982	16,499	10,434	5,435
Work if not in FTE	-0.007 [0.027]	0.022 [0.031]	0.013 [0.039]	0.110** [0.054]
Sample size	8,669	6,660	4,114	2,166
NEET	0.003 [0.008]	-0.0005 [0.009]	0.007 [0.012]	-0.007 [0.017]
Sample size	29,849	23,317	14,650	7,644

Notes: Same as for Table 4.3, except that the coverage of treatment and control groups varies according to the column heading.

4.5 Summary

This chapter has examined the impact of the introduction of the 16- to 17-year-old rate of the national minimum wage in October 2004 on the education and labour market choices made by 16- to 17-year-olds. We exploit variation in the 'bite' of this rate across local areas to define a set of treatment and control groups (initially low- and high-wage areas respectively) which we use in a difference-in-differences model to assess the policy impact of the 16- to 17-year-old rate on four main outcomes. Overall, we find little effect of the 16- to 17-year-old rate of the NMW on the probability of staying in full-time education, the probability of being NEET, and the probability of working conditional on not being in FTE. We do, however, find evidence of a positive and statistically significant effect on the probability of working among full-time students in low-wage areas relative to high-wage areas, which is relatively consistent across specifications and is stronger for females and for those from families with at least one parent in work.

Our reading of these findings is that young people's overall (main) choices between education and work are unlikely to be significantly affected by future changes to the 16- to 17-year-old rate of the NMW, but that more marginal decisions, such as the choice of taking a part-time job while studying, may be affected.

5 Impact of the development rate of the national minimum wage on 18-year-olds

In this chapter, we investigate the education and labour market choices of 18-year-olds and how these are affected by entitlement to the development rate of the national minimum wage (NMW). In particular, we consider whether there is any evidence that the NMW regime adversely affected young people's employment prospects during the recent recession.

Until recently, there had been relatively little work investigating the effect of the development rate on young people's education and labour market outcomes. Stewart (2004a and 2004b) considered the effect of the introduction of the minimum wage in 1999 (and subsequent upratings in 2000 and 2001) on the employment prospects of those most likely to have been affected, including those aged 18–21. He found no evidence of any significant adverse effects of the NMW regime on employment, including amongst young people who would have been eligible for the development rate.

The most relevant papers for our analysis are those by Rice (2010) and Fidrmuc and Tena Horrillo (2011), who examined the effect of the NMW regime on the education choices and employment prospects of 18-year-olds respectively. Rice used data from the Youth Cohort Study and found that the introduction of the development rate of the NMW significantly increased the probability that 18-year-olds would drop out of full-time education in areas where the minimum wage was high relative to local earnings, while Fidrmuc and Tena Horrillo used data from the Labour Force Survey and found a negative – but insignificant – effect of entitlement to the development rate on the likelihood of being in work during the 2000s.

We build on Rice (2010) and Fidrmuc and Tena Horrillo (2011) by considering the impact of entitlement to the development rate on a wider range of education and labour market outcomes, including the probability of being NEET (not in education, employment or training) and the likelihood of working amongst those in full-time education. We also consider how these effects changed over time, following the introduction of the 16- to 17-year-old rate and the Education Maintenance Allowance in late 2004, and the recession in 2008–09.

To do so, we make use of a regression discontinuity design (RDD). The idea behind this approach is that individuals born just a few months apart should be very similar in all respects other than their entitlement to different NMW rates. One caveat that is potentially relevant for both our analysis and that of the previous papers is that this assumption might be too strong for a comparison between 17- and 18-year-olds in a UK context. This is because some policies, such as benefit entitlement and employment custom and practice, treat those aged 16–17 differently from those aged 18 or above: for example, the eligibility criteria that must be met for individuals to claim Income Support or Jobseeker's Allowance are stricter for 17-year-olds than for 18-year-olds. It is also possible that individuals behave differently after their 18th birthday – the point at which young people traditionally become adults – for reasons other than policy or common practice. Given the available data, we cannot separate the effect of entitlement to the development rate from the effect of other policies or social norms. This means that we must be extremely cautious about interpreting our RDD estimates as the causal impact of entitlement to the development rate of the NMW, and should perhaps instead regard them as the impact of turning 18.

To investigate whether the effect of the minimum wage (or the effect of turning 18) has changed over time, we split our data into three periods of roughly equal length:

- period 1: January 2001 to September 2004;
- period 2: October 2004 to December 2007;
- period 3: January 2008 to March 2011 (including the recent recession).

For the purposes of interpretation, it is important to note that the counterfactual against which to estimate the effect of entitlement to the development rate differs across these three periods. While the adult and development rates of the NMW were introduced on 1 April 1999 – for those aged 22–65 and 18–21 respectively – it was not until 1 October 2004 that a rate for 16- to 17-year-olds was introduced. This rate was typically 25–30% lower than the development rate. This means that we are estimating the effect of the development rate relative to nothing in period 1, the effect of the age-related increase in the minimum wage (from the 16- to 17-year-old rate to the development rate) in period 2 and the impact of the age-related increase since the financial crisis and economic downturn in period 3.

It is also worth noting that the Education Maintenance Allowance (EMA) – a means-tested payment of up to £30 per week for those aged 16–19 living in poorer households who remained in full-time education – was introduced at almost the same time as the 16- to 17-year-old rate of the NMW (in September 2004) and may thus affect young people’s education choices in periods 2 and 3 but not in period 1 (unless there were anticipation effects). As both 17- and 18-year-olds – our treatment and comparison groups – would have been eligible for the EMA, it is possible that the estimates produced by our analysis in this chapter may provide some insight into the likely effects of the NMW separately from those of the EMA (an issue that we were not able to address fully in Chapter 4 for 16- to 17-year-olds). However, the caveats outlined above about other potential discontinuities that may exist as individuals turn 18 will probably prevent us from being able to draw very strong conclusions about this issue on the basis of the analysis in this chapter alone.

We consider the same four binary outcomes as in the other chapters of this report, namely:

- whether the young person is in full-time education (FTE);
- whether they are NEET (not in education, employment or training);
- whether they are in work, given that they are in FTE;
- whether they are in work, given that they are *not* in FTE.

Overall, we find little evidence of any significant effects of entitlement to the development rate of the NMW on these outcomes, nor do we find any evidence to support the idea that the existence of the minimum wage has had a particularly detrimental effect on young people’s choices since the 2008–09 recession. Having said this, however, the magnitude and sign of the results we obtain provide more support than we have found in our other analyses for the notion that the minimum wage might be having a negative effect on young people’s education and labour market outcomes, particularly on the likelihood of being in full-time education for men. These findings support the conclusions of Rice (2010) and Fidrmuc and Tena Horrrillo (2011), who found negative effects of entitlement to the development rate on education and employment outcomes respectively. We do not wish to place too much emphasis on these results, however, because none of the estimates is significantly different from zero at conventional levels; moreover, as discussed above, they may be picking up the effect of turning 18 rather than becoming entitled to a higher rate of the minimum wage per se; thus it would be rash to draw conclusions from these results alone about the effect of future changes to NMW policy.

The remainder of this chapter now proceeds as follows: Section 5.1 describes the data and methodology that we use; Section 5.2 discusses our main results and a series of robustness checks; and Section 5.3 summarises our findings on the effect of entitlement to the development rate of the NMW on the education and labour market choices of 18-year-olds relative to 17-year-olds.

5.1 Data and methodology

As outlined above, we plan to investigate the impact of entitlement to the development rate of the NMW on 18-year-olds using a regression discontinuity approach, by comparing the labour market outcomes of those we observe just before and those we observe just after their 18th birthday. Such an approach only

allows us to identify the impact of the policy change in the vicinity of the threshold, which is why we are comparing 17- and 18-year-olds rather than also including 16- and 19-year-olds (which would be possible in theory). It is also why we further restrict our sample of 17- and 18-year-olds to those observed within a limited window around the discontinuity (which we discuss in more detail below).

A standard regression discontinuity model takes the following form:

$$Y_i = f(\text{age}_i, \alpha) + \beta \times \text{Dum18}_i + \gamma \mathbf{X}_i + \varepsilon_i$$

where: Y_i is our outcome of interest – in this case, a series of binary indicators, such as whether the individual is in full-time education; $f(\text{age}_i, \alpha)$ is a polynomial of age with parameters α ; Dum18_i is a binary indicator equal to 1 if the individual is aged 18 and 0 if they are aged 17; \mathbf{X}_i is a vector of individual characteristics; and ε_{it} is the error term. We implement this approach using a series of probit regression models.

We include controls for a range of individual and family background characteristics – gender, ethnicity, highest educational qualification, parental income and work status, and so on – both to account for observable compositional differences between those either side of the threshold (although they should in theory be very similar) and to help improve the precision of our estimates.

As young people are less likely to be in education and more likely to be in work as they get older, properly accounting for the effect of age on the outcome of interest is vital to ensure that our estimates are not biased. We measure age as the number of weeks away from their 18th birthday individuals are at the time of observation. In our main analysis, we specify the age polynomial to be quadratic and allow the parameters to differ either side of the threshold,⁴⁷ but, on the whole, this choice does not materially affect our conclusions.⁴⁸

In an RDD model, the parameter β can usually be interpreted as the causal effect of the policy discontinuity on outcome Y . However, there are two limitations to bear in mind here. First, the RDD model does not allow us to consider the possibility of anticipation or lagged effects. For example, if individuals who are about to turn 18 increase their labour supply in expectation of receiving the development rate, then the RDD model would tend to underestimate the true policy impact on those just above the threshold.⁴⁹ Similarly, if the unemployed intensify their job-seeking efforts when they turn 18 and it takes some time before they find work, then there would be no discontinuity at the age threshold for the model to pick up.

Second, as discussed above, if there are other policy discontinuities at the same age, or if young people behave very differently as they turn 18 for reasons other than the NMW, then this may lead us to incorrectly attribute these changes to the impact of the NMW. The existence of such discontinuities means that we should be extremely cautious about interpreting these RDD estimates as the causal impact of entitlement to the development rate, and should perhaps instead regard them as the impact of turning 18.

To carry out our analysis, we use a sample of 17- to 18-year-olds from the Labour Force Survey (LFS). Because we are investigating young people's decisions regarding post-compulsory education participation, we restrict attention to individuals in the same academic cohort (i.e. we focus on those who would be in Year 13 – sitting A levels or equivalent qualifications – if they had chosen to remain in full-time education). This means that, without placing any further restrictions on our sample, the number of individuals born either side of the discontinuity in each quarter is likely to be extremely unbalanced. For example, in quarter 4 – which covers October to December, near the start of the academic year – 80% of

⁴⁷ In mathematical terms, $f(\text{age}_i; \alpha) = \alpha_1 \times \text{age}_i + \alpha_2 \times \text{age}_i^2 + \text{Dum18} \times (\alpha_3 \times \text{age}_i + \alpha_4 \times \text{age}_i^2)$, where age_i measures the number of weeks the young person is from their 18th birthday at the time we observe their outcome.

⁴⁸ See Appendix Table C.1 for details.

⁴⁹ The RDD model would also underestimate the true policy impact if firms substitute towards individuals just below the threshold (because they are cheaper).

our sample would be 17-year-olds and only 20% 18-year-olds if we did not impose any further restrictions. Moreover, assuming that those furthest away from the threshold are likely to be the most dissimilar, this suggests that estimates based on these unrestricted samples are likely to be biased. To ensure that our sample is as balanced as possible, we therefore restrict attention to individuals whose 18th birthday is no more than 10 weeks away at the time of observation. We also assess the sensitivity of our results to this choice.

Finally, we must deal with the fact that quarter 3 – which runs from July to September – partially covers the holiday period between academic years. There is some evidence in the LFS that individuals in full-time education mis-report their status if they are interviewed during this period. Given that 17-year-olds are more likely to be in education than 18-year-olds (even amongst individuals in the same academic year), this suggests that there is likely to be more measurement error in our control group than in our treatment group, which could potentially bias our estimates. To avoid this, we drop quarter 3 from our main analysis.⁵⁰

5.2 Results

Table 5.1 presents our main estimates of the impact of entitlement to the development rate of the NMW amongst 18-year-olds across our four outcomes and three periods of interest.

Table 5.1 Impact of entitlement to the development rate of the NMW on 18-year-olds

Outcome:	FTE	NEET	Work if in FTE	Work if not in FTE
Period 1	-0.038 [0.035]	0.015 [0.014]	-0.002 [0.048]	-0.081 [0.055]
Sample size	6,789	6,783	4,184	2,546
% of sample aged 18	Q1: 49.1% Q2: 50.2% Q4: 47.7%	Q1: 49.1% Q2: 50.2% Q4: 47.7%	Q1: 47.5% Q2: 48.0% Q4: 46.6%	Q1: 51.5% Q2: 53.2% Q4: 49.5%
Period 2	-0.012 [0.037]	0.025 [0.017]	0.016 [0.050]	-0.128* [0.068]
Sample size	5,928	5,913	3,868	1,986
% of sample aged 18	Q1: 50.9% Q2: 49.2% Q4: 45.1%	Q1: 50.9% Q2: 49.2% Q4: 45.1%	Q1: 51.1% Q2: 47.5% Q4: 44.5%	Q1: 50.4% Q2: 52.5% Q4: 46.2%
Period 3	-0.041 [0.034]	0.014 [0.017]	0.036 [0.045]	-0.013 [0.078]
Sample size	5,451	5,438	3,886	1,521
% of sample aged 18	Q1: 51.4% Q2: 47.1% Q4: 46.7%	Q1: 51.4% Q2: 47.1% Q4: 46.7%	Q1: 50.6% Q2: 46.2% Q4: 45.6%	Q1: 53.4% Q2: 49.2% Q4: 49.6%

Notes: The table reports marginal effects at the mean from a series of probit regression models. Standard errors are clustered at the individual level and shown in brackets. *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level. 18-year-olds are the treatment group and 17-year-olds are the control group. Self-employed individuals and unpaid family workers are excluded in regressions of outcomes other than FTE and NEET. The model is specified in Section 5.1. Controls for the individual are: age (entered as a quadratic polynomial of the number of weeks young people are from their 18th birthday at the time of observation, with the parameters allowed to differ either side of the threshold), gender, ethnicity, whether they are head of the household, marital status, region, highest level of qualification, whether achieved at least five GCSEs at grades A*–C, and yearly and monthly dummies. Controls for the individual's background are: parents' employment status, income quartile and qualification levels.

⁵⁰ Appendix Table C.2 shows that this decision does not materially affect our conclusions regarding the effect of entitlement to the development rate on the likelihood of being NEET or in FTE, but makes rather more difference to our estimates of the likelihood of being in work. This is perhaps unsurprising, given that we are restricting the individuals on whom we assess these outcomes according to whether or not they are in full-time education, which is markedly different in quarter 3 from in other quarters.

None of these estimates is significantly different from zero (at conventional levels), providing little evidence that entitlement to the development rate had any effect on the education and labour market choices of 18-year-olds relative to 17-year-olds. Having said this, however, the magnitude and sign of these estimates provide more support than we have found in our other analyses for the notion that the minimum wage might be having a negative effect on young people's education and labour market outcomes. For example, we find a negative (but insignificant) effect of the entitlement to the development rate on the likelihood of being in full-time education and of working amongst those who are not in full-time education, and a positive (but insignificant) effect on the probability of being NEET. We should be wary of placing too much emphasis on these results, however, because none of the estimates is significantly different from zero; moreover, as discussed above, they may be picking up the effect of turning 18 rather than of becoming entitled to a higher rate of the minimum wage per se.

In general, there is no evidence that these estimates are larger in absolute magnitude in period 1 – when we are estimating the effect of entitlement to the development rate relative to nothing – than in periods 2 and 3, when we are estimating the effect of entitlement to the development rate relative to the 16- to 17-year-old rate. There is also very little evidence that the minimum wage has had a particularly pernicious effect on young people's decisions during and immediately after the recent recession. In fact, there appears to be a positive – albeit insignificant – effect of entitlement to the development rate on the likelihood of being in work amongst those in full-time education in period 3, which is similar in magnitude to the positive (and significant) effect we found on the same outcome for 16- to 17-year-olds in Chapter 4.

It must be noted, however, that these overall insignificant effects hide some quite different estimates by quarter for some outcomes in some periods (see Appendix Table C.3 for details). For example, the effect of entitlement to the development rate on the likelihood of participating in full-time education in period 1 is positive and significant in quarter 1, but negative and significant in quarter 2; vice versa for the likelihood of being NEET. However, these differences are not systematic across periods, nor are they driven by one particular year in period 1.⁵¹ It is not clear to us why there should be such large differences across quarters in some cases, again highlighting the need for caution when interpreting these results.

We now move on to consider how these effects vary across particular subgroups of interest, namely by ability and gender. We might expect individuals at the lower end of the ability distribution to be most susceptible to the effects of the NMW regime. To investigate this possibility, Table 5.2 illustrates how our estimates of the impact of entitlement to the development rate differ by ability – as measured by the number of GCSE passes achieved at grades A*–G at the time of observation. Although the relatively small sample sizes mean that almost none of these estimates is significantly different from zero, there is some evidence that the positive (but insignificant) effect of entitlement to the development rate on the likelihood of being NEET is driven by those of lower ability, while the negative (but insignificant) effect on the probability of being in work amongst those not in full-time education appears to be driven by those of higher ability, particularly in periods 2 and 3. This somewhat counter-intuitive result could arise if, for example, higher-ability individuals who choose to leave FTE have worse non-cognitive skills – such as a lack of motivation – than lower-ability individuals, which could explain both why they have chosen to leave FTE and why they may struggle to find employment.

Table 5.3 presents estimates of the effect of entitlement to the development rate of the NMW on our four main outcomes of interest separately for males and females. Again, almost none of these estimates is significantly different from zero, but there is some evidence to suggest that the negative effect on the likelihood of being in full-time education – particularly in period 3 – is driven by men. Here, 18-year-old males are 10.3 percentage points less likely to be in full-time education than otherwise identical 17-year-old males, while 18-year-old females are actually slightly *more* likely (albeit insignificantly so) to be in education than otherwise identical 17-year-old females. This provides some suggestive evidence that the

⁵¹ Full details of the results by year and quarter are available from the authors on request.

development rate of the NMW may be drawing some young men out of full-time education and into the labour market.

Table 5.2 Impact of entitlement to the development rate of the NMW on 18-year-olds, by ability

Outcome:	FTE	NEET	Work if in FTE	Work if not in FTE
Lower ability (fewer than 5 GCSE passes at grades A*-G)				
Period 1	-0.005	0.023	0.068	-0.080
	[0.057]	[0.041]	[0.113]	[0.073]
Sample size	2,580	2,580	894	1,647
Period 2	-0.023	0.054	0.019	-0.061
	[0.063]	[0.049]	[0.091]	[0.090]
Sample size	2,122	2,120	820	1,246
Period 3	-0.046	0.052	0.028	-0.019
	[0.068]	[0.050]	[0.071]	[0.097]
Sample size	1,867	1,867	875	934
Higher ability (at least 5 GCSE passes at grades A*-G)				
Period 1	-0.037	0.004	-0.003	-0.043
	[0.034]	[0.009]	[0.051]	[0.083]
Sample size	4,208	4,166	3,289	894
Period 2	0.011	0.017	0.025	-0.202**
	[0.036]	[0.015]	[0.057]	[0.101]
Sample size	3,805	3,313	3,016	734
Period 3	-0.030	0.003	0.040	-0.079
	[0.032]	[0.011]	[0.054]	[0.120]
Sample size	3,580	3,549	2,966	586

Notes: Same as for Table 5.1.

Table 5.3 Impact of entitlement to the development rate of the NMW on 18-year-olds, by gender

Outcome:	FTE	NEET	Work if in FTE	Work if not in FTE
Men				
Period 1	-0.057	0.008	0.015	-0.118
	[0.052]	[0.022]	[0.074]	[0.073]
Sample size	3,401	3,399	1,923	1,427
Period 2	-0.019	0.026	0.054	-0.202**
	[0.054]	[0.025]	[0.070]	[0.089]
Sample size	3,022	3,014	1,842	1,125
Period 3	-0.103**	0.022	-0.040	0.041
	[0.051]	[0.025]	[0.063]	[0.108]
Sample size	2,773	2,761	1,884	859
Women				
Period 1	-0.020	0.033*	-0.016	-0.078
	[0.048]	[0.019]	[0.063]	[0.089]
Sample size	3,388	3,287	2,260	1,116
Period 2	-0.017	0.034	-0.019	-0.039
	[0.051]	[0.024]	[0.069]	[0.113]
Sample size	2,905	2,675	2,014	861
Period 3	0.028	0.004	0.106	-0.083
	[0.046]	[0.020]	[0.065]	[0.126]
Sample size	2,672	2,541	1,995	661

Notes: See Notes to Table 5.1.

We have also split our sample into low-, medium- and high-wage areas to test whether the effects of entitlement to the development rate of the NMW differ according to the level of local wages.⁵² Again, we find almost no evidence of any significant differences by area, in contrast to Rice (2010), who found significant negative effects of the introduction of the development rate on the education participation decisions of those in low-wage areas only.

Finally, we consider how robust our main estimates are to the choices we made about the age of the sample. Table 5.4 shows how our estimates vary if we expand our window of interest to consider individuals up to 15 or 20 weeks away from their 18th birthday at the time of observation (as opposed to 10 weeks, as in our main estimation).

Table 5.4 Impact of entitlement to the development rate of the NMW on 18-year-olds, varying the window length

Outcome:	FTE	NEET	Work if in FTE	Work if not in FTE
15-week window				
Period 1	-0.086** [0.033]	0.018 [0.014]	0.0006 [0.044]	-0.021 [0.051]
Sample size	9,572	9,562	5,889	3,596
% of sample aged 18	Q1: 48.9% Q2: 52.8% Q4: 40.9%	Q1: 48.9% Q2: 52.8% Q4: 40.9%	Q1: 47.6% Q2: 50.0% Q4: 39.9%	Q1: 50.8% Q2: 56.8% Q4: 42.4%
Period 2	0.013 [0.035]	-0.002 [0.015]	0.040 [0.046]	-0.029 [0.061]
Sample size	8,271	8,252	5,387	2,783
% of sample aged 18	Q1: 50.6% Q2: 51.0% Q4: 39.8%	Q1: 50.6% Q2: 51.0% Q4: 39.8%	Q1: 49.3% Q2: 48.8% Q4: 39.1%	Q1: 52.8% Q2: 55.1% Q4: 41.0%
Period 3	-0.052 [0.032]	0.017 [0.016]	0.026 [0.042]	-0.017 [0.071]
Sample size	7,774	7,769	5,531	2,172
% of sample aged 18	Q1: 50.5% Q2: 50.2% Q4: 41.1%	Q1: 50.5% Q2: 50.2% Q4: 41.1%	Q1: 49.5% Q2: 49.4% Q4: 40.2%	Q1: 53.0% Q2: 51.9% Q4: 43.1%
20-week window				
Period 1	-0.068** [0.028]	0.016 [0.012]	-0.004 [0.036]	0.011 [0.044]
Sample size	11,924	11,913	7,353	4,467
% of sample aged 18	Q1: 48.8% Q2: 56.2% Q4: 34.6%	Q1: 48.8% Q2: 56.2% Q4: 34.6%	Q1: 47.5% Q2: 53.8% Q4: 33.3%	Q1: 50.8% Q2: 59.8% Q4: 36.8%
Period 2	0.025 [0.029]	-0.005 [0.013]	0.023 [0.038]	-0.013 [0.052]
Sample size	10,291	10,284	6,714	3,463
% of sample aged 18	Q1: 49.0% Q2: 54.9% Q4: 33.4%	Q1: 49.0% Q2: 54.9% Q4: 33.4%	Q1: 47.6% Q2: 53.1% Q4: 32.9%	Q1: 51.6% Q2: 58.4% Q4: 34.0%
Period 3	-0.051* [0.026]	0.018 [0.013]	0.052 [0.035]	0.026 [0.059]
Sample size	9,655	9,650	6,873	2,693
% of sample aged 18	Q1: 49.4% Q2: 53.6% Q4: 34.9%	Q1: 49.4% Q2: 53.6% Q4: 34.9%	Q1: 48.2% Q2: 51.9% Q4: 34.0%	Q1: 52.7% Q2: 57.2% Q4: 37.2%

Notes: Same as for Table 5.1.

⁵² These results are available from the authors on request.

As outlined in Section 5.1, the problem with extending the window of interest is that we run the risk of unbalancing the groups of 17- and 18-year-olds that we are comparing. Tables 5.1 and 5.4 illustrate this difficulty. Table 5.1 shows that the proportions of 17- and 18-year-olds in each quarter are roughly balanced when using a 10-week window, with between 45% and 55% of individuals in each age group. Table 5.4, on the other hand, shows that, even when expanding the window to consider individuals whose 18th birthday is up to 15 weeks either side of the discontinuity, the proportion of 18-year-olds in quarter 4 – the most problematic quarter – falls to around 40%, with a further decrease to 33% when we extend the window to 20 weeks. These imbalances highlight the potential difficulties of using the extension of the window as a valuable robustness check on our estimates.

Having said this, however, these results do not provide much evidence to suggest that our conclusions would be significantly different if we extended the window from 10 to 15 or even 20 weeks, although the results by quarter are rather more erratic.⁵³ There is again some evidence that entitlement to the development rate of the NMW is associated with a reduction in the likelihood of being in full-time education, but this is only ever significant at conventional levels in period 1 – when the 16- to 17-year-old rate of the NMW was not in operation – and we do not wish to place too much emphasis on this finding, for the reasons discussed above.

As a last robustness check, we also carried out a falsification test, searching for discontinuities that arise when individuals turn 17, at which point there is no change in the NMW rate to which individuals are entitled, rather than 18. These types of tests are often used in studies that adopt an RDD approach. Table 5.5 presents the results of this exercise, which involves comparing those who have just turned 17 with those who are just about to do so. While none of these estimates is significantly different from zero at conventional levels, some of them are reasonably large and of a magnitude comparable to the differences we found above when individuals turn 18 and experience a change in the NMW rate to which they are entitled. This provides further support for the cautious approach we have taken in drawing conclusions about the consequences of entitlement to the development rate of the NMW on the basis of our analysis alone.

Table 5.5 Falsification test: impact of being 17 relative to 16

Outcome:	FTE	NEET	Work if in FTE	Work if not in FTE
Period 1	-0.012 [0.032]	0.006 [0.014]	0.003 [0.043]	-0.063 [0.074]
Sample size	7,130	7,106	5,092	1,994
Period 2	-0.052* [0.030]	0.022 [0.015]	-0.044 [0.041]	-0.054 [0.077]
Sample size	6,219	6,205	4,670	1,503
Period 3	0.016 [0.028]	-0.003 [0.013]	-0.010 [0.036]	0.012 [0.097]
Sample size	5,595	5,563	4,597	957

Notes: Same as for Table 5.1, except that here 17-year-olds are the treatment group and 16-year-olds are the control group.

5.3 Summary

This chapter has examined the impact of entitlement to the development rate of the NMW on young people's education and labour market choices. Overall, we find little evidence of any significant effects on these outcomes amongst 18-year-olds; neither do we find any evidence that the minimum wage has had a particularly detrimental effect on young people's outcomes since the 2008–09 recession. Having said this, however, the magnitude and sign of the estimates we find provide more support for the notion that the minimum wage might be having a negative effect on young people's education and labour market

⁵³ These results are available from the authors on request.

outcomes – particularly the likelihood of being in full-time education for men – than the analysis in other chapters of this report has suggested. We do not wish to place too much emphasis on these results, however, because none of the estimates is significantly different from zero at conventional levels. Moreover, because there are other policy as well as psychological discontinuities that occur at the same age which may be relevant for individuals making such choices, conservatively speaking our results should be interpreted as the effects of turning 18 rather than becoming entitled to a higher rate of the NMW per se. It would thus be rash to draw conclusions from these results alone about the likely effects of future changes to the development rate of the minimum wage.

6 Impact of the adult rate of the national minimum wage on 21-year-olds

On 1 October 2010, the age of entitlement to the adult rate of the national minimum wage (NMW) was reduced from 22 to 21. Thus, individuals born after 1 October 1988 saw around a 20% increase in the rate that they received on the later of 1 October 2010 or their 21st birthday. Prior to October 2010, such a discontinuity existed at age 22. This discontinuity was exploited by Dickens, Riley and Wilkinson (2010) and Fidrmuc and Tena Horrillo (2011) in previous work commissioned by the Low Pay Commission (LPC) to investigate the impact of entitlement to the adult rate of the NMW on the labour market outcomes of 22-year-olds.

They did so by comparing the labour market outcomes of individuals who had just turned 22 with those of people who were just about to turn 22 at the time that they were interviewed. This is known as a regression discontinuity design (RDD). As outlined in Chapter 5, the key idea underlying this approach is that individuals born just a few months apart (either side of the threshold) should be similar in all respects other than the policy – in this case, in all respects other than the fact that 22-year-olds are entitled to a higher minimum wage rate than 21-year-olds. Under this assumption, any significant differences between the two groups can be interpreted as the impact of entitlement to the adult rate rather than the development rate of the NMW.

Dickens, Riley and Wilkinson (2010) found positive and significant effects (of around 5 percentage points) of entitlement to the adult rate of the NMW on the likelihood of being in work amongst low-skilled workers, while Fidrmuc and Tena Horrillo (2011), using a slightly different interpretation of the RDD, found negative but insignificant effects on the same outcome. In this chapter, we follow Dickens et al. and Fidrmuc & Tena Horrillo to the extent that we compare the labour market outcomes of 21-year-olds with those of 20-year-olds (who experienced no change in the NMW rate to which they were entitled), but here we do so using a difference-in-differences framework. This is similar to the strategy outlined in Chapter 4, but instead of using low- and high-wage areas respectively as our treatment and control groups, we use 21-year-olds as our treatment group and 20-year-olds as our control group. This means that we are subtracting the change in outcomes over time amongst 20-year-olds from the change in outcomes over time amongst 21-year-olds to identify the impact of entitlement to the adult rate (relative to the development rate) of the NMW amongst 21-year-olds.

Our decision to adopt this approach rather than a regression discontinuity design is largely driven by available sample size: we only have two quarters of data during which 21-year-olds were entitled to the adult rate. Moreover, if we were to use an RDD, we would need to restrict our sample to individuals within the same academic year (to avoid comparing across cohorts, only some of whom we might expect to still be in full-time education⁵⁴) and further to impose a relatively small sample window – say 10 weeks either side of the discontinuity – to ensure that the numbers of young people just above and just below 21 years of age are relatively balanced. This would mean restricting our sample to around 600 individuals per quarter, which we do not believe would be sufficient to produce robust results.⁵⁵

Adopting a difference-in-differences approach, by contrast, means that we do not need to restrict our sample according to academic year or the length of the window either side of the discontinuity, because these factors will difference out as a result of the fact that we are comparing the difference between these two groups over time. Thus we can maximise the available sample size for our analysis.

⁵⁴ Many young people who go to university will leave when they are 21, meaning that we might expect large differences between our treatment and comparison groups in terms of the proportion of young people in education.

⁵⁵ For completeness, however, we present the results of this analysis in Appendix Table D.1.

In this chapter, we consider the impact of entitlement to the adult rate of the NMW on the same four outcomes as in previous chapters, namely:

- whether the young person is in full-time education (FTE);
- whether they are NEET (not in education, employment or training);
- whether they are in work, given that they are in FTE;
- whether they are in work, given that they are *not* in FTE.

Our results provide no evidence that entitlement to the adult rate (relative to the development rate) of the NMW amongst 21-year-olds significantly affected any of the education or labour market outcomes we consider. This conclusion is supported by a set of robustness checks. Even so, this should not be taken as definitive proof that entitlement to the adult rate had no impact on the education or labour market choices of 21-year-olds. Given that we only have access to data from the two quarters immediately following the change in age of entitlement, its impact would have had to be both immediate and large for us to be able to detect it with the relatively small amount of data that we have. We would therefore recommend that a further examination of this question is undertaken in future when more data are available.

The remainder of this chapter proceeds as follows: Section 6.1 describes the data we use and the methodology we adopt; Section 6.2 presents our main results alongside a series of robustness checks; and Section 6.3 summarises our findings of the impact of entitlement to the adult rate of the NMW on the education and labour market choices of 21-year-olds.

6.1 Data and methodology

As outlined above, we adopt a difference-in-differences approach to assessing the impact of the reduction in age of entitlement from 22 to 21 on the education and labour market choices of 21-year-olds. To do so, we use 20-year-olds as a comparison group for 21-year-olds.

Our basic model thus takes the following form:

$$Y_{it} = \alpha + \beta_1 \times after_t + \beta_2 \times Dum21_i + \delta_1 \times Dum21_i \times after_t + \gamma X_{it} + \varepsilon_{it}$$

where: Y_{it} is the outcome of interest, such as whether individual i is in full-time education at time t ; $after_t$ is a binary variable equal to 1 after 21-year-olds became entitled to the adult rate of the NMW (i.e. after 1 October 2010) and 0 otherwise; $Dum21_i$ is a binary variable equal to 1 for 21-year-olds and 0 for 20-year-olds; $treat_i \times after_t$ is a binary variable equal to 1 for 21-year-olds after 1 October 2010 and 0 otherwise; X_{it} is a vector of individual characteristics (listed in the Notes to Table 6.1); and ε_{it} is the error term.

As in Chapter 4, the key parameter of interest is δ_1 . Here, it represents the impact of entitlement to the adult rate of the NMW on 21-year-olds *compared with 20-year-olds*, i.e. it represents the impact of entitlement to the adult rate relative to the development rate. If one is willing to accept a further assumption – that 20-year-olds were unaffected by the reduction in age of entitlement to the adult rate from 22 to 21 – then δ_1 can be interpreted as the average policy impact on 21-year-olds.

In either case, the common trends assumption must hold for these interpretations to be valid; that is to say, for this approach to work, the change in outcomes over time needs to be the same for 20- and 21-year-olds, conditional on all other factors, in the absence of the policy. We check the likely validity of this assumption by testing whether the difference in outcomes between 20- and 21-year-olds stayed constant throughout the 10 years prior to 2010. This hypothesis was not rejected at the 5% significance level for

any of the four outcomes considered, thus providing no reason to suppose that the common trends assumption is violated during the period of analysis, giving us confidence in our main results.⁵⁶

For the analysis in this chapter, we use a sample of 20- to 21-year-olds from the Labour Force Survey (LFS). In our main analysis, October 2010 to March 2011 constitutes the 'after' period and January 2001 to September 2010 constitutes the 'before' period. To compensate for this very short 'after' period, we include all 20- and 21-year-olds in our analysis (rather than a subset that are within, say, six months of their 21st birthday), giving a total of 100,179 observations over the period. However, to reduce the likelihood that 20- and 21-year-olds differ in ways that might affect their education or labour market choices, we control for a range of individual and family background characteristics, including a polynomial of age, which we specify to be quadratic and in which we allow the parameters to differ either side of the threshold.⁵⁷ Full details of these controls can be found in the Notes to Table 6.1.

We check the robustness of our estimates to these assumptions about the age of the sample (in weeks) and the length of the 'before' period below.

6.2 Results

Table 6.1 presents our main estimates of the impact of the change in the age of entitlement to the adult rate from 22 to 21 on the education and labour market outcomes of 21-year-olds. This table suggests that entitlement to the adult rate (relative to the development rate) of the NMW had very little impact on any of these outcomes: the estimates are all statistically insignificant and most are very close to zero. It is worth noting, however, that the effect of entitlement to the adult rate on the likelihood of being in work amongst those in FTE is reasonably large and positive, i.e. it goes in the same direction as our results for 16- to 17-year-olds, discussed in Chapter 4.

Table 6.1 Impact of entitlement to the adult rate of the NMW on 21-year-olds, relative to the development rate

Outcome:	FTE	NEET	Work if not in FTE	Work if in FTE
Impact of entitlement to the adult rate	-0.010 [0.014]	0.00007 [0.009]	0.003 [0.016]	0.034 [0.027]
Sample size	100,179	100,179	65,931	31,844

Notes: Standard errors are clustered at the individual level and shown in brackets. *** indicates statistical significance at the 1% level, ** at the 5% level and * at the 10% level. 21-year-olds are the treatment group and 20-year-olds are the control group. The 'before' period runs from January 2001 to September 2010 and the 'after' period runs from October 2010 to March 2011. Self-employed individuals and unpaid family workers are excluded in regressions of outcomes other than FTE and NEET. The model is specified in Section 6.1. Controls for the individual are: academic age, age (entered as a quadratic polynomial of the number of weeks young people are from their 21st birthday at the time of observation, with the parameters allowed to differ either side of the threshold), gender, ethnicity, whether they are head of the household, marital status, region, highest level of qualification, whether achieved at least five GCSEs at grades A*-C, and yearly and monthly dummies. Controls for the individual's background are: parents' employment status, income quartile and qualification levels.

It is also possible to apply the same difference-in-differences approach using 22-year-olds (rather than 20-year-olds) as a comparison group. Like 20-year-olds, 22-year-olds did not experience a change in the NMW rate to which they were entitled over the period of interest: they were always entitled to the adult rate (whereas 20-year-olds were always entitled to the development rate). This means that these

⁵⁶ As in Chapter 4, we do this for each outcome by regressing the outcome of interest (using ordinary least squares) on interactions of the treatment dummy with time dummies, while controlling for individual characteristics such as gender and ethnicity. Results are available from the authors on request.

⁵⁷ In mathematical terms, $f(\text{age}_i; \alpha) = \alpha_1 \times \text{age}_i + \alpha_2 \times \text{age}_i^2 + \text{Dum}21 \times (\alpha_3 \times \text{age}_i + \alpha_4 \times \text{age}_i^2)$, where age_i measures the number of weeks the young person is from their 21st birthday at the time we observe their outcome.

alternative estimates should be interpreted as the effect of *becoming entitled* to the adult rate of the NMW (relative to always being entitled). Table 6.2 presents the results of this analysis, which are similar to the results in Table 6.1: the estimates are all statistically insignificant and close to zero, providing no evidence that becoming entitled to the adult rate of the NMW affected the labour market outcomes of 21-year-olds.

Table 6.2 Impact of entitlement to the adult rate of the NMW on 21-year-olds, using 22-year-olds as a comparison group

Outcome:	FTE	NEET	Work if not in FTE	Work if in FTE
Impact of entitlement to the adult rate	0.001 [0.011]	-0.001 [0.010]	-0.016 [0.017]	-0.006 [0.028]
Sample size	99,789	99,789	74,358	22,397

Notes: Same as for Table 6.1, with the exception that 22-year-olds are the control group (rather than 21-year-olds).

Dickens, Riley and Wilkinson (2010) restricted their analysis of the impact of entitlement to the adult rate to low-skilled individuals, for whom they argued it is likely to have the largest impact. Table 6.3 checks whether the insignificant findings reported above for all young people are concealing larger effects for those with the lowest qualifications, by presenting similar analysis for individuals with no more than a Level 3 qualification (equivalent to two A levels at grades A-E) in the middle column and for individuals with no more than a Level 2 qualification (equivalent to five A*-C grades at GCSE) in the last column. In contrast to the findings of Dickens et al., we can find no evidence of a positive and significant effect of entitlement to the adult rate on the likelihood of being in work, even amongst low-educated workers who are most likely to be affected by the change. Nor do we find any significant effects on any of the other outcomes we consider.

Table 6.3 Impact of entitlement to the adult rate of the NMW on 21-year-olds, by highest qualification

Outcome	All individuals	Level 0-3	Level 0-2
Full-time education	-0.010 [0.014]	-0.009 [0.015]	0.006 [0.011]
Sample size	100,179	88,009	41,287
NEET	0.00007 [0.009]	0.005 [0.011]	-0.001 [0.021]
Sample size	100,179	88,009	41,297
Work if not in FTE	0.003 [0.016]	-0.013 [0.019]	0.002 [0.025]
Sample size	65,931	58,673	36,929
Work if in FTE	0.034 [0.027]	0.013 [0.030]	-0.032 [0.066]
Sample size	31,844	27,160	3,050

Notes: Same as for Table 6.1, with the exception that we vary the constraint regarding highest qualification held.

We next move on to investigate whether our results are sensitive to the choices we made about the age of the sample (in weeks) and the length of the 'before' period. Table 6.4 compares our baseline estimates – which include all 20- and 21-year-olds – with estimates restricting the sample of interest to those who are within six months of their 21st birthday (i.e. it approximately halves our sample). In theory, this should mean that we are more confident that the individuals we are comparing are similar to one another in unobservable as well as observable ways, because they are born closer together, and thus should move us closer to a causal interpretation of our estimates. However, the downside is that the number of individuals observed in the 'after' period – already small – gets even smaller, thus potentially undermining the robustness of our results.

Table 6.4 shows that while none of these estimates is significantly different from zero, the effect of entitlement to the adult rate on the likelihood of being in full-time education is negative and rather larger than in our baseline model. Similarly, the positive effect on the likelihood of being in work, conditional on being in full-time education, is larger than in our baseline model, albeit still insignificant. These effects may be worthy of further investigation when more data become available in future.

Table 6.4 Impact of entitlement to the adult rate of the NMW on 21-year-olds, by age

Outcome:	FTE	NEET	Work if not in FTE	Work if in FTE
All 20- and 21-year-olds	-0.010 [0.014]	0.00007 [0.009]	0.003 [0.016]	0.034 [0.027]
Sample size	100,179	100,179	65,931	31,844
All individuals within 6 months of their 21 st birthday	-0.027 [0.019]	0.0006 [0.012]	0.010 [0.022]	0.045 [0.036]
Sample size	49,818	49,805	32,422	16,185

Notes: Same as for Table 6.1, with the exception that the lower half of the table only includes individuals who are within six months of their 21st birthday at the time of observation.

Finally, Table 6.5 compares our main results with those obtained by restricting the 'before' period to the same six months as the 'after' period but one year earlier (i.e. October 2009 to March 2010). This removes the possibility of anticipation effects – as the policy change was announced in June 2010 – and also allows us to consider changes in outcomes only over a more recent, arguably more relevant, period, in which labour market conditions were likely to be rather more similar to those in the 'after' period. This reduces the sample size dramatically (as it is decreasing the length of the 'before' period to about one-twentieth of its previous size). While none of the estimates in Table 6.5 is significantly different from zero, the point estimates again suggest a more negative effect of entitlement to the adult rate of the NMW on the likelihood of being in full-time education than our baseline specification suggested, which may be worthy of further investigation in future.

Table 6.5 Impact of entitlement to the adult rate of the NMW on 21-year-olds, varying the 'before' period

Outcome:	FTE	NEET	Work if not in FTE	Work if in FTE
'Before': January 2001 to September 2010	-0.010 [0.014]	0.00007 [0.009]	0.003 [0.016]	0.034 [0.027]
Sample size	100,179	100,179	65,931	31,844
'Before': October 2009 to March 2010	-0.038 [0.026]	-0.017 [0.016]	0.029 [0.031]	0.005 [0.040]
Sample size	8,789	8,786	5,311	3,248

Notes: Same as for Table 6.1, with the exception that the lower half of the table only includes individuals observed between October 2009 and March 2010 in the 'before' period.

Overall, however, these results do not provide any evidence to reject the hypothesis that entitlement to the adult rate (relative to the development rate) of the NMW had no impact on the education and labour market choices of 21-year-olds.

6.3 Summary

In this chapter, we investigated the impact of the reduction in the age of entitlement to the adult rate of the NMW from 22 to 21 in October 2010 on the education and labour market outcomes of 21-year-olds, by comparing the change in outcomes over time amongst 21-year-olds with the change in outcomes over

time amongst 20-year-olds (who remained entitled to the development rate of the NMW throughout this period). The evidence presented here suggests that this change had no significant effect on the likelihood of being in full-time education, the likelihood of being NEET or the likelihood of being in work for 21-year-olds relative to 20-year-olds. Moreover, this conclusion is supported by the results of a number of robustness checks. We caution that these results are not definitive, however, as we are only able to observe a relatively small number of individuals for a relatively short period following the policy change. We would therefore recommend that a further examination of this question is undertaken in future when more data are available.

7 Conclusions

The aim of this report has been to provide evidence on the impact of local labour market conditions in general – and the national minimum wage (NMW) in particular – on the education and labour market choices of young people in the UK.

It is clear that there have been significant changes in young people's education and labour market choices over the last 10 years. In particular, the proportion of 16- to 17-year-olds in full-time education has increased substantially and the proportion in work has fallen by about the same amount. These patterns accelerated during the 2008–09 recession. Of particular note is the fact that education participation increased dramatically amongst 16- to 17-year-olds without a Level 2 qualification (equivalent to five GCSEs at grades A*–C) during the recession, suggesting that this group may have been choosing to stay in education longer than they otherwise would have done in order to avoid the prospect of becoming NEET (not in education, employment or training). By contrast, the proportion of 18- to 21-year-olds who are NEET has increased substantially over the course of the recession – particularly amongst the lowest-educated – while the proportion in full-time education has barely risen. This suggests, as we might expect, that there are greater barriers to participation in full-time education as a response to changing labour market conditions for 18- to 21-year-olds than for 16- to 17-year-olds.

In considering the effect of local labour market conditions on young people's education and employment choices in a more systematic way, however, our analysis suggests that these conditions are having very little *causal* effect on young people's decisions. Using data from the Longitudinal Study of Young People in England (LSYPE), our results show that – after accounting for a wide range of individual and school characteristics – local youth wage rates do not affect the main education or employment choices made by young people between the ages of 16 and 19. This suggests that changes in the 16- to 17-year-old or development rates of the NMW are unlikely to have a direct impact on the main activities young people choose to undertake.

These results can be reconciled with the descriptive evidence outlined above if we believe that young people base their expectations about the returns to education on national rather than local labour market conditions, and thus are more likely to respond to differences across time than between areas. It could also be that our descriptive analysis is biased because it does not take full account of different individual characteristics, which are included in our LSYPE analysis.

The conclusion that local wage rates appear to matter very little for young people's education and employment choices is confirmed by our analysis of the impact of entitlement to the NMW, using data from the LFS. For the adult and development rates, we find very little evidence of any significant effects – although the magnitude and sign of our estimates of the impact of entitlement to the development rate provide some support for the notion that the minimum wage might be having a negative effect on young people's education and labour market outcomes, particularly the likelihood of being in full-time education for men. (This result is supported by our finding in the LSYPE that local youth unemployment rates have a positive and significant effect on the likelihood of being in full-time education amongst 18-year-olds.) However, we did not find any evidence that the effect of entitlement to the development rate became more negative after the recent recession.

We do not wish to place too much emphasis on the results of our analysis of the development rate, however, as none of the estimates is significantly different from zero at conventional levels; moreover, there are other policy and psychological discontinuities that occur as individuals turn 18 that might also affect young people's decisions, such that our identification strategy works less well in this context. This means that, conservatively speaking, these results are probably better interpreted as the impact of turning 18 than as the impact of becoming entitled to the development rate per se.

We did not find any impact of the 16- to 17-year-old rate on the probability of staying in full-time education, the probability of being NEET, or the probability of working conditional on not being in full-time education either. We did, however, find evidence of a statistically significant *positive* impact of the 16- to 17-year-old rate on the probability of working among full-time students in low-wage areas relative to high-wage areas.⁵⁸ This suggests that while young people's main choices between education and work were not affected by the introduction of the 16- to 17-year-old rate, the more marginal decision of whether to take a part-time job while studying appears to have been positively affected by the increase in the expected return to part-time work in low-wage areas. In line with this conclusion, our LSYPE analysis also suggests that higher local youth unemployment rates negatively affect the likelihood of working whilst in full-time education, but have relatively little impact on young people's main activity choices (except where noted above).

In summary, the results of our comprehensive study of the impact of the minimum wage on the education and labour market choices made by young people in the period leading up to and beyond the 2008–09 recession provide little evidence that the NMW regime has drawn young people out of education and into the labour market, nor that it has adversely affected their employment chances. This generally confirms the findings of previous work produced for the LPC and others, and provides reassurance that recent increases in the NMW (as well as future increases) are unlikely to unduly influence the choices that young people make as they transition out of education and into the labour market.

⁵⁸ We also found evidence of a positive but insignificant effect of entitlement to the development rate on the probability of working amongst those in full-time education for 18-year-olds relative to 17-year-olds.

Appendix A: Extra analysis for Chapter 3

Table A.1 Summary statistics for outcome variables at each age

Outcome	Age 16	Age 17	Age 18
NEET	9%	11%	16%
FTE	72%	53%	45%
Drop out of FTE, conditional on being in FTE in the previous year	N/A	32%	31%
In work, conditional on being in FTE	48%	49%	39%
In work, conditional on not being in FTE	65%	75%	71%

Table A.2 Correlation between local labour market conditions

	Average house prices (2006)	Unemployment (16-19, 2006)	Unemployment (16-24, 2006)	Unemployment (16-64, 2006)	Median wages (16-21, 2006)	Median wages (16-24, 2006)	Median wages (16-64, 2006)
Average house prices (2006)	-						
Unemployment (16-19, 2006)	-0.3593**	-					
Unemployment (16-24, 2006)	-0.3394**	0.8336**	-				
Unemployment (16-64, 2006)	-0.4688**	0.7324**	0.8365**	-			
Median wages (16-21, 2006)	0.5341**	-0.0931	-0.0691	-0.0513	-		
Median wages (16-24, 2006)	0.3776**	0.0160	-0.0272	0.0247	0.7883**	-	
Median wages (16-64, 2006)	0.5676**	-0.0069	-0.0423	-0.0231	0.7102**	0.7412**	-

Notes: Local labour market conditions are measured at the unitary authority / county level. ** denotes statistical significance at the 5% level; *** denotes statistical significance at the 1% level.

Table A.3 Description of individual and school characteristics included in the model of post-compulsory education choices

Variable	Description
Gender of young person (YP)	Binary variable equal to 1 if YP is male.
Ethnicity of YP	Entered as a set of binary variables where 'white' is the reference category and other categories are 'mixed', 'Indian', 'Pakistani', 'Bangladeshi', 'Black Caribbean', 'Black African' and 'other'.
English as an additional language (EAL) status of YP	Binary variable equal to 1 if YP reports that English is their second language in Wave 1 of the survey. The variable is set equal to 0 for those who report being bilingual.
Special educational needs (SEN) status of YP	Set of binary variables where 'no SEN' is the reference category and other categories are 'SEN with a statement' and 'SEN without a statement'. A small proportion of YP have SEN with a statement as it indicates a higher level of need and provision by the local authority. This information is taken from the Pupil Level Annual Schools Census (PLASC) extract that has been linked to LSYPE.
Eligibility for free school meals (FSM)	Binary variable equal to 1 if YP is eligible for FSM. This information is taken from the PLASC extract.
KS2 average points score	Key Stage (KS) 2 average points score, taken from PLASC extract. Standardised on the LSYPE sample to have a mean of 0 and standard deviation of 1. The LSYPE cohort took KS2 tests in English, Maths and Science at age 11; the average points score is the average mark attained in these three components.
Urban/rural location	Set of binary variables where 'urban' is the reference category and other categories are 'sparse area' and 'less sparse hamlet to town'. 84% of the LSYPE sample live in an area classified as 'urban'.
Smoking	Binary variable equal to 1 if YP reports ever smoking cigarettes in Wave 1 of the survey.
Truancy	Binary variable equal to 1 if YP reports ever being truant from school in Wave 1 of the survey.
Expectation of friends' participation	Binary variable equal to 1 if YP thinks friends will remain in full-time education after age 16; asked in Wave 1 of the survey.
Expected receipt of EMA	Binary variable equal to 1 if the main parent believes that the YP would be eligible for the Education Maintenance Allowance (EMA) if they remained in post-compulsory education or training; asked in Wave 1 of the survey.
Locus of control	Derived measure of YP's locus of control from responses to eight questions about success in Wave 2 of LSYPE, e.g. 'I can pretty much decide what will happen in my life' and 'If you work hard at something you'll usually succeed'. A higher score relates to a higher degree of feeling that one is in control of one's life. The total score is standardised on the LSYPE sample to have a mean of 0 and standard deviation of 1.
Importance of job or career	Binary variable equal to 1 if YP strongly agrees that having a job or career in the future is important; asked in Wave 1 of the survey.
Part-time working while in compulsory schooling	Set of binary variables where 'doesn't work' is the reference category and other categories are 'works between 1 and 5 hours per week', 'works between 6 and 10 hours per week' and 'works more than 10 hours per week'. Responses to this question are taken from Wave 3 of the survey, when YP is in their final year of compulsory education.
Attitude to school	Scale of YP's attitude to school created from responses to 12 questions around feelings about school, e.g. 'I am happy when I am at school' and 'I work as hard as I can in school'. The total score created (where a higher value indicates a more positive attitude to school) is standardised on the LSYPE sample to have a mean of 0 and standard deviation of 1.
Independent school	Binary variable equal to 1 if YP was sampled from an independent school.

Sixth form	Binary variable equal to 1 if YP's school also has a sixth form.
Housing tenure	Set of binary variables relating to the YP's parents' housing tenure, where 'own or mortgage home' is the reference category and other categories are 'rent from the local authority', 'rent privately' and 'other' (which includes living with parents). These variables are derived from a question answered by the main parent respondent to the survey in Wave 1.
Household income	Set of binary variables relating to how YP's parents manage on their income, where 'managing quite well' is the reference category and other categories are 'just getting by' and having 'financial difficulties'. These variables are derived from a question answered by the main parent respondent to the survey in Wave 1.
Educational qualifications of YP's parents	Two binary variables, the first equal to 1 if YP's mother has a degree and the second equal to 1 if YP's father has a degree. If one parent is missing from the household – e.g. if it is a single-parent household – then this is captured by a binary variable.
Work status of YP's parents	Two sets of binary variables relating to YP's mother and father, where 'not in work' is the reference category and other categories are 'works full-time' and 'works part-time'.
Household is in receipt of means-tested benefits	Binary variable equal to 1 if YP's household receives a means-tested benefit, derived from questions in Wave 1 of the survey.
Main parent's aspirations for YP	Set of binary variables relating to the main parent's aspirations for YP after post-compulsory education, where the reference category is 'full-time education' and other categories are 'apprenticeship, training or learn trade' and 'full-time work or other'. The main parent answered this question in Wave 1 of the survey.
Neighbourhood deprivation	Average of the Income Deprivation Affecting Children Index (IDACI) of all pupils at YP's school.
School-level influence on post-compulsory education	Percentage of pupils in YP's school in the previous cohort who continued in post-compulsory education or training. Derived from the Key Stage 4/5 combined file (provided by the Department for Education), which includes indicators for whether pupils are present in post-compulsory education, apprenticeships, work-based learning or vocational training.

Table A.4 (panel 1) Results for full specification of the model

	<i>Binary outcome</i>									
	NEET			FTE			Drop out of FTE, conditional on being in FTE in the previous year			
	Age 16 (2006-07)	Age 17 (2007-08)	Age 18 (2008-09)	Age 16 (2006-07)	Age 17 (2007-08)	Age 18 (2008-09)	Age 16 (2006-07)	Age 17 (2007-08)	Age 18 (2008-09)	Age 17 (2007-08)
<i>Reference level for those in the lowest quartile of wages</i>	0.080	0.092	0.145	0.703	0.530	0.429	-	0.318		0.340
Median wages for 16- to 24-year-olds: quartile 2	0.010 [0.008]	-0.015 [0.012]	0.010 [0.015]	-0.006 [0.018]	-0.000 [0.023]	0.029 [0.022]	-	0.009 [0.022]		-0.041 [0.025]
Median wages for 16- to 24-year-olds: quartile 3	0.001 [0.008]	0.004 [0.012]	0.004 [0.015]	0.004 [0.017]	-0.022 [0.024]	0.004 [0.024]	-	0.032 [0.024]		-0.052 [0.029]
Median wages for 16- to 24-year-olds: highest quartile	0.005 [0.011]	0.008 [0.015]	0.001 [0.017]	-0.007 [0.023]	-0.021 [0.025]	0.006 [0.033]	-	0.046 [0.026]		-0.027 [0.033]
<i>Reference level for those in the lowest quartile of unemployment</i>	0.081	0.090	0.147	0.704	0.513	0.370	-	0.337		0.385
Average unemployment for 16- to 24-year-olds: quartile 2	-0.003 [0.008]	-0.011 [0.013]	-0.019 [0.014]	0.008 [0.017]	0.000 [0.026]	0.071*** [0.022]	-	-0.005 [0.026]		-0.059** [0.025]
Average unemployment for 16- to 24-year-olds: quartile 3	-0.002 [0.007]	0.016 [0.012]	-0.025 [0.015]	-0.010 [0.018]	0.006 [0.024]	0.098*** [0.024]	-	-0.031 [0.024]		-0.081*** [0.025]
Average unemployment for 16- to 24-year-olds: highest quartile	-0.004 [0.008]	0.028** [0.013]	-0.018 [0.016]	0.008 [0.019]	0.020 [0.024]	0.091*** [0.027]	-	-0.031 [0.024]		-0.071** [0.030]
Average house price: quartile 2	0.002 [0.006]	-0.008 [0.009]	-0.022 [0.013]	-0.006 [0.015]	-0.003 [0.021]	0.010 [0.025]	-	0.002 [0.020]		-0.001 [0.031]
Average house price: quartile 3	-0.008 [0.007]	-0.022** [0.010]	-0.062*** [0.012]	0.034 [0.018]	0.027 [0.023]	0.015 [0.023]	-	-0.019 [0.022]		0.028 [0.028]
Average house price: highest quartile	-0.008 [0.009]	-0.022 [0.011]	-0.024 [0.015]	0.040** [0.020]	0.038 [0.024]	0.016 [0.034]	-	-0.049** [0.023]		0.027 [0.035]
Male	-0.001 [0.004]	0.027*** [0.007]	0.004 [0.009]	-0.070*** [0.010]	-0.092*** [0.013]	-0.063*** [0.013]	-	0.066*** [0.013]		0.013 [0.016]
Ethnicity: mixed	-0.013 [0.009]	-0.016 [0.014]	0.013 [0.024]	0.084*** [0.021]	0.099*** [0.027]	0.055 [0.034]	-	-0.069*** [0.024]		0.039 [0.041]
Ethnicity: Indian	-0.029*** [0.006]	-0.004 [0.016]	-0.043** [0.018]	0.151*** [0.012]	0.182*** [0.027]	0.260*** [0.030]	-	-0.120*** [0.024]		-0.137*** [0.027]
Ethnicity: Pakistani	-0.002 [0.010]	-0.005 [0.014]	0.016 [0.020]	0.091*** [0.019]	0.149*** [0.029]	0.187*** [0.031]	-	-0.129*** [0.025]		-0.073** [0.029]

Ethnicity: Bangladeshi	-0.031*** [0.006]	-0.030** [0.013]	0.017 [0.028]	0.114*** [0.025]	0.130*** [0.042]	0.133*** [0.047]	-	-0.118*** [0.033]	-0.040 [0.050]
Ethnicity: Black Caribbean	-0.009 [0.014]	-0.039** [0.015]	-0.034 [0.022]	0.124*** [0.021]	0.155*** [0.039]	0.174*** [0.042]	-	-0.083** [0.036]	-0.053 [0.050]
Ethnicity: Black African	-0.042*** [0.004]	-0.049*** [0.011]	-0.056*** [0.022]	0.194*** [0.011]	0.229*** [0.037]	0.358*** [0.037]	-	-0.125*** [0.032]	-0.155*** [0.035]
Ethnicity: other	-0.004 [0.015]	-0.017 [0.021]	-0.026 [0.030]	0.118*** [0.025]	0.144*** [0.045]	0.201*** [0.050]	-	-0.083** [0.041]	-0.096** [0.047]
English as an additional language	-0.001 [0.014]	-0.033*** [0.012]	-0.065*** [0.014]	0.011 [0.032]	0.085** [0.033]	0.076** [0.036]	-	-0.051 [0.029]	-0.080** [0.032]
SEN: no statement	0.021*** [0.008]	0.013 [0.011]	0.041*** [0.015]	0.007 [0.016]	0.023 [0.022]	-0.015 [0.022]	-	-0.006 [0.022]	0.025 [0.028]
SEN: statement	-0.016 [0.009]	-0.008 [0.017]	-0.002 [0.026]	0.159*** [0.015]	0.263*** [0.032]	0.261*** [0.042]	-	-0.173*** [0.029]	-0.140*** [0.038]
Eligible for FSM	0.002 [0.009]	-0.002 [0.013]	0.021 [0.019]	0.017 [0.022]	0.014 [0.026]	0.007 [0.028]	-	-0.001 [0.028]	-0.004 [0.033]
Lives in 'sparse' area	-0.009 [0.014]	-0.000 [0.025]	-0.047 [0.030]	0.044 [0.033]	0.061 [0.049]	0.030 [0.040]	-	-0.003 [0.052]	0.016 [0.053]
Lives in 'less sparse' area	0.005 [0.007]	-0.004 [0.010]	0.007 [0.012]	0.005 [0.015]	0.019 [0.018]	0.010 [0.018]	-	-0.006 [0.017]	0.013 [0.021]
Independent school at age 14	-0.049*** [0.004]	-0.050*** [0.018]	-0.074*** [0.024]	0.212*** [0.014]	0.104 [0.066]	0.126 [0.080]	-	-0.028 [0.078]	-0.096 [0.076]
School has a sixth form	-0.006 [0.005]	-0.004 [0.008]	0.000 [0.009]	0.008 [0.012]	0.004 [0.016]	0.009 [0.015]	-	-0.001 [0.016]	0.007 [0.016]
Smokes at age 14	0.040*** [0.011]	0.047*** [0.016]	0.016 [0.017]	-0.090*** [0.021]	-0.125*** [0.023]	-0.061** [0.026]	-	0.092*** [0.028]	0.053 [0.038]
Plays truant at age 14	0.006 [0.006]	0.019 [0.012]	0.046*** [0.016]	-0.048*** [0.016]	-0.047** [0.020]	-0.080*** [0.019]	-	0.021 [0.022]	0.055 [0.029]
Standardised KS2 average points score	-0.013*** [0.003]	-0.015*** [0.004]	-0.025*** [0.005]	0.075*** [0.007]	0.075*** [0.008]	0.078*** [0.009]	-	-0.046*** [0.008]	-0.036*** [0.010]
Young person thinks friends will stay in FTE after age 16 (age 14)	-0.028*** [0.005]	-0.030*** [0.008]	-0.039*** [0.011]	0.093*** [0.012]	0.069*** [0.014]	0.041*** [0.014]	-	-0.021 [0.015]	0.002 [0.018]
Standardised locus of control (age 15)	0.001 [0.003]	-0.001 [0.005]	-0.003 [0.005]	-0.000 [0.007]	0.006 [0.008]	0.022*** [0.007]	-	-0.009 [0.008]	-0.021** [0.009]
Having a job or career in the future is important (age 14)	-0.029*** [0.008]	-0.014 [0.011]	-0.023 [0.014]	0.009 [0.016]	-0.017 [0.020]	0.030 [0.020]	-	0.019 [0.020]	-0.002 [0.024]

Works between 1 and 5 hours per week	-0.007 [0.006]	-0.004 [0.010]	-0.013 [0.013]	-0.026 [0.015]	-0.058*** [0.017]	-0.051*** [0.017]	-	0.041** [0.018]	0.052** [0.021]
Works between 6 and 10 hours per week	-0.025*** [0.005]	-0.043*** [0.009]	-0.043*** [0.012]	-0.053*** [0.018]	-0.101*** [0.019]	-0.061*** [0.020]	-	0.081*** [0.021]	0.038 [0.025]
Works more than 10 hours per week	-0.030*** [0.006]	-0.038*** [0.013]	-0.053*** [0.018]	-0.121*** [0.028]	-0.208*** [0.030]	-0.088*** [0.033]	-	0.194*** [0.039]	0.027 [0.049]
Young person's attitude to school	-0.020*** [0.003]	-0.018*** [0.004]	-0.035*** [0.005]	0.095*** [0.006]	0.083*** [0.007]	0.085*** [0.007]	-	-0.044*** [0.008]	-0.033*** [0.009]
Housing tenure: other	-0.020 [0.017]	0.015 [0.035]	-0.029 [0.039]	0.031 [0.054]	0.012 [0.058]	0.061 [0.070]	-	-0.054 [0.057]	0.019 [0.071]
Housing tenure: rent from LA	0.023*** [0.007]	0.035*** [0.010]	0.060*** [0.014]	-0.047*** [0.015]	-0.073*** [0.019]	-0.079*** [0.020]	-	0.050** [0.022]	0.043 [0.029]
Housing tenure: rent privately	0.027 [0.015]	0.059*** [0.023]	0.092*** [0.030]	-0.047 [0.028]	-0.076** [0.033]	-0.102*** [0.030]	-	0.061 [0.035]	0.099** [0.047]
Household income: 'just getting by'	0.005 [0.005]	0.006 [0.007]	0.014 [0.010]	-0.015 [0.011]	-0.005 [0.013]	-0.009 [0.014]	-	0.003 [0.013]	-0.006 [0.017]
Household income: 'financial difficulties'	0.036*** [0.013]	-0.003 [0.015]	0.009 [0.021]	-0.051** [0.026]	0.032 [0.030]	0.039 [0.035]	-	-0.033 [0.029]	-0.005 [0.039]
Mother has a degree	-0.016** [0.008]	-0.010 [0.012]	0.043** [0.019]	0.085*** [0.016]	0.116*** [0.022]	0.049** [0.024]	-	-0.080*** [0.019]	0.003 [0.025]
Father has a degree	-0.019** [0.008]	0.011 [0.014]	-0.012 [0.016]	0.112*** [0.016]	0.114*** [0.021]	0.124*** [0.023]	-	-0.055*** [0.019]	-0.070*** [0.021]
Mother works full-time	-0.003 [0.007]	-0.020** [0.009]	-0.035*** [0.012]	-0.034** [0.017]	-0.065*** [0.019]	-0.016 [0.019]	-	0.067*** [0.020]	-0.012 [0.023]
Mother works part-time	-0.008 [0.006]	-0.037*** [0.009]	-0.039*** [0.011]	-0.014 [0.015]	-0.024 [0.018]	0.006 [0.018]	-	0.028 [0.019]	-0.034 [0.022]
Father works full-time	-0.002 [0.009]	-0.013 [0.014]	-0.011 [0.019]	-0.033 [0.025]	0.005 [0.030]	-0.031 [0.032]	-	-0.058** [0.028]	0.061 [0.035]
Father works part-time	-0.004 [0.015]	-0.003 [0.022]	0.006 [0.030]	0.051 [0.035]	0.086 [0.046]	0.006 [0.052]	-	-0.107*** [0.039]	0.064 [0.062]
Household in receipt of means-tested benefits at age 14	0.005 [0.008]	-0.004 [0.013]	0.002 [0.017]	-0.020 [0.021]	0.043 [0.026]	0.008 [0.027]	-	-0.046 [0.025]	-0.018 [0.034]
Main parent reports YP is likely to be eligible for EMA if in FTE post-16	-0.006 [0.005]	-0.006 [0.008]	-0.004 [0.010]	0.016 [0.012]	0.026 [0.016]	0.022 [0.017]	-	-0.019 [0.016]	-0.011 [0.019]
Main parent would like YP to work full-time post-16	0.027 [0.014]	0.000 [0.020]	0.009 [0.027]	-0.166*** [0.036]	-0.120*** [0.039]	-0.099** [0.041]	-	0.053 [0.048]	0.088 [0.058]

Main parent would like YP to take an apprenticeship, training or learn a trade post-16	0.008 [0.007]	-0.016 [0.008]	-0.007 [0.012]	-0.158*** [0.017]	-0.148*** [0.019]	-0.174*** [0.019]	-	0.045 [0.023]	0.118*** [0.033]
Mean IDACI for pupils at YP's school	0.041 [0.025]	0.051 [0.040]	0.022 [0.048]	-0.112 [0.060]	-0.075 [0.080]	-0.008 [0.083]	-	0.096 [0.077]	0.124 [0.092]
% of pupils continuing into post-16 education or training (previous cohort)	-0.049 [0.039]	-0.026 [0.062]	0.024 [0.072]	0.210** [0.106]	0.321** [0.143]	0.550*** [0.132]	-	-0.248** [0.125]	-0.355*** [0.124]
N	11,117	9,892	9,236	11,117	9,892	9,245	-	7,797	5,385
R ²	0.215	0.123	0.127	0.264	0.153	0.157	-	0.068	0.059

Notes: All models include missing dummy variables where appropriate. Standard errors are clustered at school level and are shown in brackets. ** denotes statistical significance at the 5% level; *** denotes statistical significance at the 1% level. All regressions are weighted by a survey and non-response weight specific to the wave of the survey.

Table A.4 (panel 2) Results for full specification of the model, continued

	<i>Local labour market conditions</i>				<i>Binary outcome</i>				
	<i>In work, conditional on being in FTE</i>		<i>In work, conditional on not being in FTE</i>		<i>In work, conditional on being in FTE</i>		<i>In work, conditional on not being in FTE</i>		
	Age 16 (2006-07)	Age 17 (2007-08)	Age 18 (2008-09)	Age 16 (2006-07)	Age 17 (2007-08)	Age 18 (2008-09)	Age 16 (2006-07)	Age 17 (2007-08)	Age 18 (2008-09)
<i>Reference level for those in the lowest quartile of wages</i>	0.555 [0.025]	0.584 [0.031]	0.370 [0.030]	0.705 [0.039]	0.801 [0.028]	0.743 [0.027]			
Median wages for 16- to 24-year-olds: quartile 2	0.011 [0.025]	0.010 [0.031]	0.036 [0.030]	-0.063 [0.039]	0.021 [0.028]	-0.047 [0.027]			
Median wages for 16- to 24-year-olds: quartile 3	0.008 [0.024]	-0.016 [0.031]	0.065 [0.033]	-0.029 [0.036]	-0.004 [0.029]	-0.018 [0.028]			
Median wages for 16- to 24-year-olds: highest quartile	-0.034 [0.033]	-0.076** [0.036]	-0.013 [0.041]	-0.037 [0.055]	-0.032 [0.035]	-0.016 [0.033]			
<i>Reference level for those in the lowest quartile of unemployment</i>	0.593	0.591	0.468	0.700	0.824	0.766			
Average unemployment for 16- to 24-year-olds: quartile 2	0.017 [0.026]	0.003 [0.034]	-0.015 [0.033]	-0.016 [0.044]	0.028 [0.025]	-0.005 [0.027]			
Average unemployment for 16- to 24-year-olds: quartile 3	-0.031 [0.026]	-0.029 [0.029]	-0.042 [0.034]	0.011 [0.038]	-0.048 [0.026]	-0.007 [0.029]			
Average unemployment for 16- to 24-year-olds: highest quartile	-0.085*** [0.028]	-0.096*** [0.029]	-0.061 [0.037]	0.016 [0.040]	-0.074** [0.029]	0.002 [0.031]			
Average house price: quartile 2	0.017 [0.024]	0.016 [0.026]	-0.042 [0.030]	0.038 [0.031]	0.019 [0.020]	0.048** [0.024]			
Average house price : quartile 3	0.066** [0.027]	0.066** [0.030]	-0.014 [0.029]	0.076 [0.039]	0.057** [0.023]	0.125*** [0.023]			
Average house price : highest quartile	0.048 [0.031]	0.043 [0.031]	-0.027 [0.038]	0.061 [0.046]	0.054** [0.025]	0.056 [0.030]			
Male	-0.087*** [0.015]	-0.098*** [0.016]	-0.058*** [0.017]	0.044 [0.023]	-0.022 [0.016]	0.012 [0.016]			
Ethnicity: mixed	-0.032 [0.038]	-0.076 [0.047]	-0.040 [0.041]	-0.048 [0.067]	0.009 [0.041]	-0.051 [0.046]			
Ethnicity: Indian	-0.160*** [0.030]	-0.161*** [0.030]	-0.029 [0.029]	-0.042 [0.079]	-0.141*** [0.052]	-0.072 [0.051]			
Ethnicity: Pakistani	-0.176*** [0.035]	-0.281*** [0.034]	-0.128*** [0.033]	-0.204*** [0.075]	-0.065 [0.052]	-0.197*** [0.052]			

Ethnicity: Bangladeshi	-0.040 [0.051]	-0.038 [0.048]	0.113** [0.052]	-0.031 [0.106]	0.033 [0.058]	-0.162*** [0.058]
Ethnicity: Black Caribbean	-0.041 [0.042]	-0.019 [0.047]	-0.030 [0.053]	-0.184** [0.088]	0.003 [0.065]	-0.010 [0.064]
Ethnicity: Black African	-0.038 [0.044]	0.001 [0.052]	-0.004 [0.046]	-0.186 [0.158]	-0.010 [0.054]	-0.211** [0.089]
Ethnicity: other	-0.062 [0.050]	-0.113 [0.059]	-0.011 [0.056]	-0.272** [0.127]	0.009 [0.061]	-0.082 [0.072]
English as an additional language	-0.056 [0.040]	0.018 [0.047]	-0.024 [0.039]	0.012 [0.083]	0.031 [0.044]	0.125*** [0.035]
SEN: no statement	-0.059** [0.024]	-0.147*** [0.031]	-0.057 [0.030]	-0.121*** [0.030]	-0.020 [0.024]	-0.063** [0.025]
SEN: statement	-0.291*** [0.041]	-0.379*** [0.038]	-0.285*** [0.033]	-0.170** [0.070]	-0.133*** [0.051]	-0.144*** [0.055]
Eligible for FSM	-0.004 [0.032]	0.010 [0.036]	-0.040 [0.038]	-0.046 [0.038]	-0.030 [0.030]	-0.079** [0.033]
Lives in 'sparse' area	-0.146** [0.062]	-0.144** [0.061]	-0.071 [0.060]	0.046 [0.085]	-0.043 [0.039]	0.059 [0.077]
Lives in 'less sparse' area	-0.013 [0.018]	-0.035 [0.023]	0.026 [0.023]	0.000 [0.032]	-0.005 [0.025]	-0.013 [0.022]
Independent school at age 14	-0.043 [0.119]	0.011 [0.095]	-0.021 [0.089]	0.066 [0.133]	0.073 [0.051]	0.093 [0.053]
School has a sixth form	-0.026 [0.016]	-0.013 [0.020]	0.002 [0.018]	-0.010 [0.025]	0.012 [0.017]	0.003 [0.017]
Smokes at age 14	0.051 [0.030]	0.011 [0.038]	0.031 [0.043]	-0.105*** [0.034]	-0.046 [0.027]	-0.018 [0.028]
Plays truant at age 14	-0.016 [0.025]	-0.018 [0.032]	0.073** [0.034]	0.023 [0.027]	-0.033 [0.024]	-0.048 [0.026]
Standardised KS2 average points score	0.028*** [0.010]	0.026** [0.012]	-0.010 [0.012]	0.026 [0.014]	0.027*** [0.010]	0.033*** [0.010]
YP thinks friends will stay in FTE after age 16 (age 14)	0.024 [0.017]	0.016 [0.021]	-0.014 [0.022]	0.042** [0.021]	0.033** [0.017]	0.072*** [0.018]
Standardised locus of control (age 15)	-0.012 [0.008]	-0.019 [0.010]	-0.027*** [0.010]	-0.010 [0.017]	0.000 [0.011]	-0.007 [0.011]
Having a job or career in the future is important (age 14)	0.057** [0.023]	0.012 [0.029]	0.012 [0.035]	0.106*** [0.032]	0.047** [0.023]	0.017 [0.023]

Works between 1 and 5 hours per week	0.179*** [0.020]	0.115*** [0.022]	0.065*** [0.024]	0.108*** [0.030]	0.046** [0.021]	0.039 [0.022]
Works between 6 and 10 hours per week	0.347*** [0.019]	0.257*** [0.028]	0.099*** [0.030]	0.168*** [0.029]	0.132*** [0.017]	0.115*** [0.021]
Works more than 10 hours per week	0.373*** [0.029]	0.399*** [0.036]	0.216*** [0.057]	0.221*** [0.030]	0.115*** [0.023]	0.123*** [0.030]
Young person's attitude to school	0.030*** [0.008]	0.020 [0.010]	0.027** [0.011]	0.026** [0.011]	0.012 [0.008]	0.038*** [0.008]
Housing tenure: other	-0.007 [0.072]	0.086 [0.085]	0.049 [0.087]	-0.069 [0.133]	-0.050 [0.082]	0.025 [0.077]
Housing tenure: rent from LA	-0.088*** [0.022]	-0.090*** [0.028]	0.015 [0.030]	-0.069** [0.030]	-0.035 [0.020]	-0.088*** [0.023]
Housing tenure: rent privately	-0.022 [0.034]	-0.065 [0.044]	-0.037 [0.045]	-0.084 [0.054]	-0.075 [0.042]	-0.112** [0.045]
Household income: 'just getting by'	-0.007 [0.015]	0.007 [0.019]	0.017 [0.019]	-0.019 [0.024]	-0.017 [0.017]	-0.012 [0.016]
Household income: 'financial difficulties'	-0.084** [0.037]	-0.064 [0.042]	-0.072 [0.040]	-0.120*** [0.046]	-0.017 [0.035]	-0.031 [0.039]
Mother has a degree	-0.074*** [0.021]	-0.118*** [0.025]	-0.083*** [0.023]	-0.012 [0.058]	-0.039 [0.034]	-0.129*** [0.035]
Father has a degree	-0.087*** [0.018]	-0.102*** [0.023]	-0.168*** [0.022]	-0.017 [0.077]	-0.131*** [0.040]	-0.053 [0.036]
Mother works full-time	0.113*** [0.021]	0.115*** [0.024]	0.111*** [0.026]	0.048 [0.033]	0.084*** [0.021]	0.083*** [0.021]
Mother works part-time	0.104*** [0.021]	0.093*** [0.024]	0.088*** [0.025]	0.048 [0.031]	0.103*** [0.021]	0.080*** [0.021]
Father works full-time	0.047 [0.034]	0.076 [0.041]	0.099** [0.039]	0.072 [0.048]	0.068** [0.033]	0.037 [0.036]
Father works part-time	-0.016 [0.051]	0.092 [0.059]	0.146** [0.065]	0.042 [0.091]	0.022 [0.053]	-0.025 [0.061]
Household in receipt of means-tested benefits at age 14	-0.033 [0.030]	-0.018 [0.035]	-0.036 [0.037]	0.006 [0.039]	0.017 [0.029]	0.022 [0.029]
Main parent reports that YP is likely to be eligible for EMA if in FTE post-16	-0.025 [0.018]	-0.047** [0.021]	-0.043** [0.021]	-0.010 [0.028]	0.004 [0.018]	0.007 [0.019]
Main parent would like YP to work full-time post-16	-0.001 [0.050]	-0.132** [0.058]	-0.158*** [0.057]	0.011 [0.046]	0.025 [0.036]	0.028 [0.041]

Main parent would like YP to take an apprenticeship, training or learn a trade post-16	0.047 [0.026]	-0.058 [0.035]	-0.067** [0.033]	0.046 [0.025]	0.071*** [0.017]	0.057*** [0.019]
Mean IDACI for pupils at YP's school	-0.519*** [0.089]	-0.376*** [0.099]	-0.024 [0.104]	-0.285** [0.125]	-0.127 [0.091]	-0.103 [0.091]
% of pupils continuing into post-16 education or training (previous cohort)	-0.236 [0.123]	-0.241 [0.140]	-0.338** [0.133]	-0.013 [0.193]	-0.146 [0.131]	-0.430*** [0.137]
<i>N</i>	8,582	5,821	4,850	2,532	4,169	4,495
<i>R</i> ²	0.173	0.176	0.091	0.151	0.139	0.130

Notes: All models include missing dummy variables where appropriate. Standard errors are clustered at school level and are shown in brackets. ** denotes statistical significance at the 5% level; *** denotes statistical significance at the 1% level. All regressions are weighted by a survey and non-response weight specific to the wave of the survey.

Table A.5 The impact of local labour market conditions measured at parliamentary constituency level on post-compulsory education decisions: marginal effects from probit regression

<i>Local labour market conditions (at PC level)</i>	<i>Binary outcome</i>														
	<i>NEET</i>						<i>FTE</i>						<i>Drop out of FTE, conditional on being in FTE in the previous year</i>		
	<i>Age 16</i>	<i>Age 17</i>	<i>Age 18</i>	<i>Age 16</i>	<i>Age 17</i>	<i>Age 18</i>	<i>Age 16</i>	<i>Age 17</i>	<i>Age 18</i>	<i>Age 16</i>	<i>Age 17</i>	<i>Age 18</i>			
Median wages for 16- to 64-year-olds: quartile 2	-0.000 [0.006]	0.002 [0.009]	0.002 [0.012]	0.018 [0.014]	-0.016 [0.019]	-0.012 [0.018]	0.018 [0.014]	-0.016 [0.019]	-0.012 [0.018]	-	-0.004 [0.018]	-0.014 [0.021]			
Median wages for 16- to 64-year-olds: quartile 3	-0.007 [0.006]	0.002 [0.010]	-0.005 [0.011]	0.016 [0.014]	0.000 [0.019]	0.003 [0.019]	0.016 [0.014]	0.000 [0.019]	0.003 [0.019]	-	0.006 [0.018]	0.015 [0.022]			
Median wages for 16- to 64-year-olds: highest quartile	0.001 [0.007]	0.011 [0.009]	0.005 [0.013]	0.009 [0.015]	-0.020 [0.020]	-0.014 [0.022]	0.009 [0.015]	0.009 [0.015]	-0.014 [0.022]	-	0.029 [0.020]	0.027 [0.024]			
Average unemployment for 16- to 64-year-olds: quartile 2	-0.004 [0.007]	0.014 [0.011]	-0.002 [0.013]	0.026 [0.016]	-0.002 [0.018]	0.020 [0.020]	0.026 [0.016]	-0.002 [0.018]	0.020 [0.020]	-	-0.001 [0.018]	-0.018 [0.022]			
Average unemployment for 16- to 64-year-olds: quartile 3	-0.004 [0.007]	0.015 [0.011]	0.003 [0.013]	0.012 [0.015]	-0.006 [0.020]	0.034 [0.019]	0.012 [0.015]	-0.006 [0.020]	0.034 [0.019]	-	0.007 [0.019]	-0.031 [0.020]			
Average unemployment for 16- to 64-year-olds: highest quartile	0.003 [0.000]	0.027** [0.012]	0.035** [0.014]	0.015 [0.016]	0.002 [0.021]	-0.004 [0.021]	0.015 [0.016]	0.002 [0.021]	-0.004 [0.021]	-	0.002 [0.020]	0.004 [0.023]			
<i>N</i>	11,117	9,892	9,236	11,117	9,892	9,245	11,117	9,892	9,245	-	7,797	5,385			
<i>R</i> ²	0.215	0.122	0.128	0.264	0.153	0.156	0.264	0.153	0.156	-	0.068	0.057			

Notes: All models include controls for quartile of average house prices and the range of other individual and family background characteristics outlined in Table A.3. Standard errors are clustered at school level and are shown in brackets. ** denotes statistical significance at the 5% level; *** denotes statistical significance at the 1% level. All regressions are weighted by a survey and non-response weight specific to the wave of the survey.

Table A.5 continued

<i>Local labour market conditions (at PC level)</i>	<i>Binary outcome</i>					
	<i>In work, conditional on being in FTE</i>			<i>In work, conditional on not being in FTE</i>		
	<i>Age 16</i>	<i>Age 17</i>	<i>Age 18</i>	<i>Age 16</i>	<i>Age 17</i>	<i>Age 18</i>
Median wages for 16- to 64-year-olds: quartile 2	-0.037 [0.021]	-0.012 [0.024]	0.003 [0.024]	-0.004 [0.034]	-0.002 [0.021]	0.001 [0.021]
Median wages for 16- to 64-year-olds: quartile 3	-0.020 [0.021]	0.032 [0.026]	0.036 [0.026]	0.006 [0.030]	0.001 [0.022]	0.005 [0.021]
Median wages for 16- to 64-year-olds: highest quartile	-0.030 [0.023]	-0.034 [0.025]	-0.015 [0.026]	-0.011 [0.032]	-0.034 [0.021]	-0.006 [0.022]
Average unemployment for 16- to 64-year-olds: quartile 2	-0.042** [0.020]	-0.061** [0.027]	-0.040 [0.025]	0.050 [0.034]	-0.023 [0.024]	-0.009 [0.024]
Average unemployment for 16- to 64-year-olds: quartile 3	-0.051** [0.021]	-0.072*** [0.026]	-0.045 [0.026]	0.027 [0.034]	-0.026 [0.024]	-0.009 [0.024]
Average unemployment for 16- to 64-year-olds: highest quartile	-0.101*** [0.024]	-0.062** [0.027]	-0.059** [0.027]	0.006 [0.039]	-0.055** [0.026]	-0.055** [0.025]
<i>N</i>	8,582	5,818	4,850	2,532	4,169	4,495
<i>R</i> ²	0.173	0.174	0.090	0.151	0.136	0.131

Notes: All models include controls for quartile of average house prices and the range of other individual and family background characteristics outlined in Table A.3. Standard errors are clustered at school level and are shown in brackets. ** denotes statistical significance at the 5% level; *** denotes statistical significance at the 1% level. All regressions are weighted by a survey and non-response weight specific to the wave of the survey.

Appendix B: Extra analysis for Chapter 4

Table B.1 Probit regression results corresponding to Tables 4.3–4.5 in Section 4.3

Outcome:	FTE	NEET	Work if in FTE	Work if not in FTE
Basic difference-in-differences estimate (low-wage versus high-wage areas)				
Low-wage×after	0.003 [0.018]	0.001 [0.007]	0.043* [0.023]	0.026 [0.035]
Sample size	23,313	23,301	16,499	6,658
Mid-wage areas as a second treatment group				
Low-wage×after	0.004 [0.018]	0.002 [0.008]	0.044* [0.023]	0.024 [0.035]
Mid-wage×after	-0.033* [0.018]	0.003 [0.008]	0.003 [0.022]	0.038 [0.034]
Sample size	36,685	36,668	25,631	10,797
Using a continuous measure of local wages				
Localwage×after	-0.661 [0.510]	0.093 [0.225]	-0.587 [0.810]	0.072 [0.992]
Localwage ² ×after	0.086 [0.067]	-0.014 [0.029]	0.069 [0.107]	-0.013 [0.131]
P-value for joint significance	0.432	0.571	0.233	0.899
Sample size	36,685	36,668	25,631	10,797

Notes: Same as for Tables 4.3–4.5.

Our main difference-in-differences findings are based on the treatment and control groups defined by the 10th percentile of the local 16–21 wage distribution at the unitary authority / county level. Table B.2 ranks the UA/Cs in Great Britain according to this measure of wages, from lowest to highest. Forty-six areas covered the bottom 30%, 71 areas covered the top 30% and 53 areas covered the middle 40% of Great Britain. For our main findings, the treatment and control groups each contain 30% of the total population of 16- to 17-year olds in Great Britain. The treatment group has the lowest local wages and the control group has the highest local wages. As a robustness check, we have also experimented with treatment and control groups that each cover 10%, 20% or 40% of all young people.

Table B.2 Unitary authorities / counties in Great Britain ranked from lowest to highest local wage, based on the 10th percentile of local wages

Lowest-ranking 56	Middle-ranking 57	Highest-ranking 57
<i>25 areas for the bottom 10%</i>	Kingston upon Hull UA	Waltham Forest
Clackmannanshire	Derby UA	Telford and Wrekin UA
East Ayrshire	North East Lincolnshire UA	Greenwich
East Lothian	Cornwall	The Scottish Borders
Hartlepool UA	Plymouth UA	West Berkshire UA
Pembrokeshire	Dundee City	<i>25 areas in the top 10%–20%</i>
Blackburn with Darwen UA	Stoke-on-Trent UA	Portsmouth UA
Angus	Falkirk	Newport
Darlington UA	Stirling	East Renfrewshire
South Ayrshire	Hillingdon	Barnet
Highland	<i>24 areas in the middle 20%</i>	Cardiff
Blaenau Gwent	South Gloucestershire UA	Slough UA
Durham	Denbighshire	Sutton
Perth & Kinross	Herefordshire UA	Lewisham
North Lanarkshire	Lincolnshire	Brent
City of Bristol UA	Glasgow City	Merthyr Tydfil
Flintshire	West Midlands MC	Isle of Anglesey
Torbay UA	Warwickshire	Oxfordshire

Redcar and Cleveland UA Fife South Lanarkshire Nottinghamshire Devon Northumberland Staffordshire Blackpool UA	North Ayrshire Rhondda Cynon Taff Bridgend Shropshire Midlothian West Yorkshire MC Somerset Gloucestershire	Caerphilly Luton UA Hertfordshire West Dunbartonshire Bexley Monmouthshire Milton Keynes UA Warrington UA Southend-on-Sea UA Richmond upon Thames City of Edinburgh Ceredigion Ealing
<i>12 areas in the bottom 10%–20%</i> Cheshire East Riding of Yorkshire UA Lancashire Stockton-on-Tees UA Cumbria Rutland UA Middlesbrough UA Gwynedd Medway Towns UA Worcestershire Norfolk Conwy	Powys Bath and North East Somerset UA Moray Peterborough UA Newham Renfrewshire West Lothian East Dunbartonshire Leicester UA	<i>27 areas for the top 10%</i> Wandsworth Reading UA Brighton and Hove UA Merton Barking and Dagenham Wokingham UA Swindon UA Surrey Buckinghamshire Enfield Haringey Bracknell Forest UA Orkney Islands Harrow Kingston upon Thames Croydon Lambeth Southwark City of Westminster Hounslow Windsor and Maidenhead UA Hackney Camden Islington Hammersmith and Fulham Kensington and Chelsea Tower Hamlets
<i>9 areas in the bottom 20%–30%</i> Tyne and Wear MC Derbyshire Argyll & Bute The Vale of Glamorgan Greater Manchester MC Aberdeenshire North Yorkshire Leicestershire Merseyside	<i>9 areas in the top 30%–40%</i> Hampshire Essex Wiltshire Poole UA York UA Bournemouth UA Northamptonshire Aberdeen City Bromley	
<i>20 areas in the bottom 30%–40%</i> Dorset Neath Port Talbot Carmarthenshire Nottingham UA North Somerset UA North Lincolnshire UA South Yorkshire MC Inverclyde Dumfries & Galloway Swansea	<i>19 areas in the top 20%–30%</i> Kent Havering Thurrock UA Torfaen Isle of Wight UA Suffolk Cambridgeshire Halton UA West Sussex Southampton UA East Sussex Bedfordshire Redbridge Wrexham	
<i>Continues at top of next column (Middle-ranking 57)</i>	<i>Continues at top of next column (Highest-ranking 57)</i>	

Notes: London is divided into 32 boroughs.

Table B.3 Impact on all outcomes, by subgroup of young people

Outcome	Female	Male	Has at least 5 GCSEs	Doesn't have at least 5 GCSEs	Father is in the household	Father is absent
FTE	0.008 [0.021]	0.012 [0.023]	0.003 [0.017]	0.014 [0.029]	0.004 [0.018]	0.028 [0.030]
Sample size	11,617	11,700	14,076	9,241	16,479	6,838
NEET	-0.014 [0.012]	0.015 [0.014]	-0.001 [0.007]	0.004 [0.021]	0.014 [0.010]	-0.036* [0.022]
Sample size	11,617	11,700	14,076	9,241	16,479	6,838
Work if not in FTE	0.060 [0.046]	-0.010 [0.041]	0.076 [0.053]	-0.0009 [0.037]	-0.024 [0.038]	0.107** [0.050]
Sample size	2,760	3,900	2,099	4,561	4,273	2,387
Work if in FTE	0.060** [0.028]	0.021 [0.029]	0.048* [0.025]	0.017 [0.033]	0.036 [0.024]	0.056 [0.036]
Sample size	8,799	7,700	11,873	4,626	12,087	4,412

Continued ...

Outcome	Father absent or out of work	Father in work	Mother absent or out of work	Mother in work	Has no parents in work	Has at least one parent in work
FTE	0.029 [0.027]	0.003 [0.019]	0.013 [0.028]	0.009 [0.018]	0.030 [0.038]	0.003 [0.021]
Sample size	8,634	14,683	7,700	15,617	4,423	12,887
NEET	-0.030 [0.019]	0.016* [0.009]	-0.017 [0.020]	0.008 [0.010]	-0.043 [0.030]	0.003 [0.011]
Sample size	8,634	14,683	7,700	15,617	4,423	12,887
Work if not in FTE	0.062 [0.044]	-0.005 [0.041]	0.059 [0.047]	0.004 [0.040]	0.039 [0.055]	0.041 [0.044]
Sample size	2,995	3,665	2,655	4,005	1,730	3,380
Work if in FTE	0.031 [0.032]	0.043* [0.026]	0.006 [0.033]	0.052** [0.025]	-0.020 [0.041]	0.072*** [0.028]
Sample size	5,597	10,902	5,014	11,485	2,675	9,442

Notes: This table corresponds to Table 4.6 for all four outcomes and includes additional definitions of subgroups.

Table B.4 Difference-in-differences robustness checks for three outcomes, by sample period

Outcome	<i>Excluding anticipation period</i>					
	Before: 2002Q4–2004Q3 After: 2004Q4–2005Q3	Before: 2003Q4–2004Q3 After: 2004Q4–2005Q3	Before: 2003Q4–2004Q3 After: 2004Q4–2006Q3	Before: 2002Q4–2003Q3 After: 2004Q4–2006Q3	Before: 2002Q4–2004Q1 After: 2004Q4–2006Q3	Before: 2002Q4–2004Q1 After: 2004Q4–2006Q1
FTE	0.007 [0.018]	-0.001 [0.020]	0.003 [0.018]	0.018 [0.019]	0.008 [0.017]	0.012 [0.018]
Sample size	17,631	11,579	17,265	17,661	20,750	18,253
NEET	-0.008 [0.011]	-0.007 [0.013]	0.0007 [0.011]	-0.002 [0.011]	0.002 [0.010]	-0.004 [0.011]
Sample size	17,631	11,579	17,265	17,661	20,750	18,253
Work if not in FTE	0.030 [0.036]	0.031 [0.041]	0.020 [0.037]	0.025 [0.036]	0.024 [0.033]	0.019 [0.034]
Sample size	5,194	3,365	4,831	4,951	5,870	5,223

Notes: This table corresponds to Table 4.7, for outcomes other than 'Work if in FTE'. The corresponding baseline estimates are given in Table B.5.

Table B.5 Difference-in-differences robustness checks for three outcomes, by sample coverage and local wage measure

Outcome	Baseline	England only	Local wage measured at the 15th percentile	Local wage measured at the 20th percentile	Local wage measured at the 25th percentile
FTE	0.011 [0.016]	0.015 [0.017]	0.013 [0.016]	0.018 [0.016]	0.013 [0.016]
Sample size	23,317	19,195	23,120	22,922	23,060
NEET	-0.0005 [0.009]	0.005 [0.010]	0.004 [0.009]	0.002 [0.010]	0.0008 [0.009]
Sample size	23,317	19,195	23,120	22,922	23,060
Work if not in FTE	0.022 [0.031]	-0.004 [0.034]	0.019 [0.031]	0.009 [0.031]	0.024 [0.031]
Sample size	6,660	5,356	6,645	6,595	6,547

Notes: This table corresponds to Tables 4.8 and 4.9, for outcomes other than 'Work if in FTE'.

Appendix C: Extra analysis for Chapter 5

Table C.1 Impact of entitlement to the development rate of the NMW on 18-year-olds, varying the specification of the age polynomial

Outcome:	FTE	NEET	Work if in FTE	Work if not in FTE
Quadratic				
Period 1	-0.084*** [0.026]	0.020* [0.011]	0.003 [0.035]	0.012 [0.040]
Sample size	6,789	6,783	4,184	2,546
Period 2	0.020 [0.027]	-0.009 [0.012]	0.037 [0.036]	0.012 [0.048]
Sample size	5,928	5,913	3,868	1,986
Period 3	-0.036 [0.025]	0.015 [0.012]	0.022 [0.033]	-0.002 [0.055]
Sample size	5,451	5,438	3,886	1,521
Cubic				
Period 1	-0.048 [0.032]	0.017 [0.013]	0.002 [0.043]	-0.063 [0.050]
Sample size	6,789	6,783	4,184	2,546
Period 2	-0.006 [0.033]	0.017 [0.015]	0.010 [0.044]	-0.083 [0.061]
Sample size	5,928	5,913	3,868	1,986
Period 3	-0.045 [0.031]	0.014 [0.015]	0.029 [0.040]	-0.002 [0.070]
Sample size	5,451	5,438	3,886	1,521
Cubic spline				
Period 1	-0.038 [0.046]	0.020 [0.019]	-0.029 [0.061]	-0.096 [0.073]
Sample size	6,789	6,783	4,184	2,546
Period 2	-0.026 [0.050]	0.042* [0.022]	0.082 [0.065]	-0.239*** [0.089]
Sample size	5,928	5,913	3,868	1,986
Period 3	-0.0007 [0.045]	0.019 [0.022]	0.067 [0.059]	-0.086 [0.101]
Sample size	5,451	5,438	3,886	1,521

Notes: Same as for Table 5.1, with the exception that the specification of the age polynomial varies by panel.

Table C.2 Impact of entitlement to the development rate of the NMW on 18-year-olds, all quarters

Outcome:	FTE	NEET	Work if in FTE	Work if not in FTE
Period 1	-0.028 [0.032]	0.020 [0.014]	-0.100** [0.046]	-0.003 [0.042]
Sample size	8,627	8,614	3,427	5,115
Period 2	0.017 [0.034]	0.009 [0.017]	-0.116** [0.058]	0.003 [0.044]
Sample size	7,261	7,253	2,596	4,573
Period 3	-0.025 [0.032]	0.021 [0.016]	-0.076 [0.065]	0.072* [0.041]
Sample size	6,611	6,594	2,019	4,540

Notes: Same as for Table 5.1.

Table C.3 Impact of entitlement to the development rate of the NMW on 18-year-olds, by quarter

Outcome:	FTE	NEET	Work if in FTE	Work if not in FTE
Period 1				
Quarter 1	0.113* [0.060]	-0.041* [0.024]	0.039 [0.085]	-0.093 [0.094]
Sample size	2,390	2,383	1,498	869
Quarter 2	-0.150** [0.059]	0.065*** [0.025]	0.006 [0.081]	-0.181** [0.092]
Sample size	2,611	2,611	1,556	1,035
Quarter 4	-0.085 [0.071]	0.027 [0.022]	-0.069 [0.091]	-0.088 [0.119]
Sample size	1,782	1,774	1,123	638
Period 2				
Quarter 1	-0.127* [0.069]	0.073** [0.030]	0.117 [0.094]	-0.215* [0.122]
Sample size	1,825	1,823	1,161	630
Quarter 2	0.068 [0.071]	-0.018 [0.026]	-0.099 [0.093]	-0.039 [0.142]
Sample size	1,874	1,866	1,213	631
Quarter 4	0.015 [0.059]	0.022 [0.026]	-0.014 [0.080]	-0.214* [0.113]
Sample size	2,227	2,102	1,461	724
Period 3				
Quarter 1	-0.064 [0.056]	-0.010 [0.026]	0.045 [0.076]	0.068 [0.135]
Sample size	2,152	2,131	1,536	596
Quarter 2	-0.033 [0.068]	0.052 [0.032]	0.182** [0.085]	-0.115 [0.132]
Sample size	1,782	1,683	1,207	558
Quarter 4	-0.051 [0.057]	0.015 [0.029]	-0.191** [0.079]	-0.022 [0.174]
Sample size	1,508	1,372	1,128	363

Notes: Same as for Table 5.1.

Appendix D: Extra analysis for Chapter 6

Table D.1 Impact of entitlement to the adult rate of the NMW on 21-year-olds, using a regression discontinuity design and varying the length of the window

Outcome	10 weeks	20 weeks	26 weeks	39 weeks	50 weeks
FTE	0.047 [0.20]	-0.052 [0.106]	-0.122 [0.075]	-0.082 [0.061]	-0.072 [0.059]
Sample size	693	1,335	1,647	2,047	2,128
NEET	-0.165 [0.139]	0.040 [0.059]	0.015 [0.046]	0.033 [0.042]	0.045 [0.041]
Sample size	654	1,352	1,670	2,056	2,130
Work if in FTE	-0.285 [0.255]	-0.050 [0.142]	-0.099 [0.106]	-0.073 [0.087]	-0.070 [0.085]
Sample size	271	531	659	808	837
Work if not in FTE	0.120 [0.274]	-0.147 [0.129]	-0.063 [0.100]	-0.076 [0.083]	-0.082 [0.080]
Sample size	410	796	979	1,209	1,252

Notes: Standard errors are clustered at the individual level and shown in brackets. *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level. 21-year-olds are the treatment group and 20-year-olds are the control group. The sample only includes individuals of academic age 20. Self-employed individuals and unpaid family workers are excluded in regressions of outcomes other than FTE and NEET. Controls for the individual are: age (entered as a quadratic polynomial with the parameters allowed to differ either side of the threshold), gender, ethnicity, whether they are head of the household, marital status, region, highest level of qualification, whether achieved at least five GCSEs at grades A*-C, and month of interview dummies. Controls for the individual's background are: parents' employment status, income quartiles and qualification levels.

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