# The impact of the minimum wage on young people

## Final Report to the Low Pay Commission

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## About London Economics

London Economics is one of Europe's leading specialist economics and policy consultancies and has its head office in London. We also have offices in Brussels, Dublin, Cardiff and Budapest, and associated offices in Paris and Valletta.

We advise clients in both the public and private sectors on economic and financial analysis, policy development and evaluation, business strategy, and regulatory and competition policy. Our consultants are highly-qualified economists with experience in applying a wide variety of analytical techniques to assist our work, including cost-benefit analysis, multi-criteria analysis, policy simulation, scenario building, statistical analysis and mathematical modelling. We are also experienced in using a wide range of data collection techniques including literature reviews, survey questionnaires, interviews and focus groups.

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# Executive summary

London Economics were commissioned by the Low Pay Commission to undertake an analysis of various issues relating to the impact of the minimum wage on young people. In particular, there were three dominant areas of research:

- the first element of the analysis builds on previous research in the area to better understand the impact of the **relative freeze** in the Youth Development Rate and 16-17 Year Old Rate that occurred from 2011 compared to the adult rate of the National Minimum Wage. This element of the analysis considered both the impact of the relative freeze on employment rates amongst young people eligible for the particular rates, as well as whether there was any impact on employment on becoming eligible for the adult rate of the National Minimum Wage.
- The second element of the analysis considered the impact of the **reduction in the threshold age** for the adult rate of the National Minimum Wage that occurred in October 2010, and the labour market implications this had for young people aged between the old and the new age thresholds.
- The third main element of the analysis explores the impact of **raising the participation age** on the determinants of undertaking education and training, and the extent to which local labour market conditions affect the labour force participation of young people

  In addition to these main strands of research, additional analysis was undertaken to estimate the extent of unpaid or low-paid internships.

## What was the impact of the relative freeze in the minimum wage on young persons' labour market outcomes?

This chapter addresses two key questions:

1) Did the slowdown and subsequent freeze in the minimum wages for young people influence employment rates for those eligible for the two youth rates?

Initially, this question is addressed using a descriptive analysis examining the evolution of employment rates before and after each uprating for individuals qualifying for the 16-17 Year Old Rate and the Youth Development Rate from 2003 to 2013.

Across all individuals eligible for the Youth Development Rate, compared to a decline in employment between 2007-08 and 2011-12 from **56%** to **45%**, the slow-down and subsequent freeze in the Youth Development Rate **appears to have stabilised the average employment rate for qualifying individuals** (remaining at 45%). Similarly, across all individuals eligible for the 16-17 Year Old Rate, compared to a decline in employment between 2007-08 and 2011-12 from **32%** to **22%**, **the slow-down and subsequent freeze in the 16-17 Year Old Rate appears to have also stabilised the average employment rate for qualifying individuals** - standing at approximately **21%** since the freeze.

Tracking the same individuals eligible for the 16-17 Year Old Rate (between 2003 and 2013), employment rates before and after the October uprating have generally increased for these individuals. In contrast, from the onset of the recession (2008 to 2010), the average employment

rates for individuals qualifying for the Youth Development Rate have declined following the October uprating. However, since the slower growth in the Youth Development Rate relative to the adult rate of the National Minimum Wage in October 2011, and the subsequent freeze in the in the Youth Development Rate in October 2012, **employment rates have risen**, thereby restoring the historic patterns of stable employment.

Undertaking a difference-in-difference analysis, the relative employment of young people (aged 16-20) was assessed (compared to individuals aged 21 or 22). The analysis was undertaken for a range of time periods around the time of the announcement or implementation of the freeze in the relevant minimum wages, but also covering the period of relative slowdown and subsequent freeze in the minimum wage.

- The results suggest that there is strong and statistically significant evidence of a positive impact on employment rates for young people. More specifically, individuals aged between 16 and 20 were **2.5 percentage points more likely to be employed** compared to individuals aged 21 and 22 as a result of the slowdown and freeze in the two youth rates. A similar positive impact is achieved when the estimation is carried out by gender and for 'low-skilled' individuals (those with highest qualification at or below 5 or more GCSEs at grades A*-C).
- In addition, **there is evidence to suggest that employment rates for 'low-skilled' individuals improved upon the announcement of the freeze in March 2012**. In particular, individuals eligible for the 16-17 Year Old Rate (Youth Development Rate) experienced, on average, an **increase of 3.4 (3.8) percentage points in their employment rates** compared to individuals aged 21 and 22 when the freeze in the rates was announced.
- It is important to note that the results are sensitive to the time period used for the analysis. Furthermore, the results above relate to the *announcement* of the freeze in the Youth Development Rate and the 16-17 Year Old Rate (which normally takes place approximately six months prior to actual implementation). In contrast, when the analysis is undertaken considering the *implementation* date (rather than the announcement date) the results become statistically insignificant.

2) Did the freeze in the Youth Development Rate have an effect on labour market outcomes for individuals on becoming eligible for the adult rate?

This question was addressed using econometric modelling. Using information from the Labour Force Survey, we adopted a regression discontinuity design to examine the impact of National Minimum Wage policy on labour market outcomes for young people. Specifically, we investigated the effect of the freeze in the Youth Development Rate (for 18 to 20/21 year olds) relative to the adult rate (21 or 22 year olds and above) on employment outcomes for individuals who were six months either side of the threshold age. We achieved this by dividing the LFS data into two periods, namely:

(i) *'Lower-jump'* period October 2006 to September 2011, where the increase in the minimum wage on becoming eligible for the adult rate was steady at around 20% and;

(ii) *'Higher-jump'* period October 2011 to September 2013, where the increase in the minimum wage was considerably higher.

**Overall, we found that there was no detrimental labour market impact of becoming eligible for the adult rate of the National Minimum Wage.**

At an aggregate level, our results suggest that there is **no statistical evidence of an impact on employment prospects across young people**. However, when we restrict our sample to consider 'low-skilled' individuals only (defined as individuals with highest qualification equivalent to GCSEs, other or no qualification), the results are more striking.

- In the 'lower-jump' period, our results are consistent with previous studies which suggest that there is a positive impact on employment outcomes when low-skilled workers become entitled to the adult rate. In particular, we find a **positive and significant** impact for young men, equivalent to an increase of around 9.8 percentage points in their employment prospects when they qualify for the adult rate compared to individuals who were six months below the threshold age. We also find a positive impact for young women in this period, but the effect is statistically insignificant.

- The results in the 'higher-jump' period contrast those seen in the 'lower-jump' period, with the model identifying a strongly negative impact on employment outcomes for both men and women. **However, after a closer examination of the data and robustness checks, the results seem to be driven by discontinuities in the data, as opposed to minimum wage policy**. Moreover, given the relatively small samples in this period, we believe the true impact will only become clear as more data becomes available.

- We find that in both periods, changes in employment appear to be a result of changes in the level of unemployment, but there is also a small negative impact at the threshold age on hours worked by young people.

We also attempt to disentangle the impact of the recession on labour market outcomes for individuals from the potential labour market outcomes associated with becoming eligible for the adult rate of the NMW. Using a similar approach to the above analysis, we find that **there is no detrimental labour market impact of becoming eligible for the adult rate during the recessionary period**, whereas there was a positive labour market impact of becoming eligible for the adult rate in the pre-recession period.

### Impact of the change in the eligibility threshold on labour market outcomes

Following the change in the eligibility criteria for the adult rate of the National Minimum Wage in October 2010, we estimated the impact of entitlement to the adult rate on 21 year olds across a range of employment outcomes. To achieve this, a **difference-in-difference** approach was adopted, using both 20 year olds and 22 year olds as control groups.

However, identifying the effects of entitlement to the adult rate on 21 year olds' employment outcomes was further complicated by the changing nature of the labour market following the start of the recession in April 2008. The main findings can be summarised as follows.

- Following the change in the age threshold, there was **no evidence of adverse effects on the likelihood of 21 year olds being employed**. In fact, there is weak evidence of a positive employment effect for women, although this is only statistically significant when using 20 year olds as the control group and the result is sensitive to the specification used.

- Nevertheless, there may still have been an adverse employment effect on the average number of hours worked. Whilst point estimates imply an effect, the results only have statistical significance for men when those in full-time education are excluded from the estimation. Therefore, the evidence is too weak to place confidence in this result.

- There was some evidence that entitlement to the adult rate reduced inactivity rates, in particular for men, with a parallel increase in unemployment. Therefore, it appears likely that if entitlement to the adult rate did reduce inactivity, this led to increased unemployment rather than employment.

## Determinants of undertaking education and training

Understanding whether local labour market conditions, particularly the local wage and unemployment rate, affect young people's decisions to enter the labour market is another key research question. Using individual level data containing personal and family characteristics from the *Understanding Society* study and its predecessor, the *British Household Panel Survey* (BHPS) over the period 2004-2012, this data was complemented with information on local labour market conditions taken from the **Annual Population Survey**.  The analysis focused on a range of labour market outcomes (employed, in full-time education or 'not in education, employment or training' (NEET)), as well as labour market outcomes conditional on being in full-time education at the age of 16 or 17. The analysis demonstrated that:

- Individuals aged 18 and living in local areas with a higher adult unemployment rate are more likely to be in full-time education and less likely to be in employment.
- Youth unemployment rates have a more tenuous effect, however, the sign is consistent with the findings for the adult unemployment rate, demonstrating a positive association between higher youth unemployment and being in full-time education.
- The results suggest that the greater is the gap between the *average adult wage* in the local area and the *adult rate of the NMW*, the higher is the probability of being in full-time education at the age of 18, and the lower the probability of being in employment. This suggests that young individuals living in *mo*re affluent areas stay longer in full-time education (possibly because they expect to gain a higher return from investment in education).
- Parental education plays a significant role in determining young people's labour market choices. Young people having at least one parent in possession of higher education qualifications are approximately 14 to 16 percentage points more likely to be in full-time education at the ages of 17 and 18 respectively; approximately 6 percentage points less likely to be in employment at the age of 17 (and 4 percentage points at the age of 18).

Controlling for being in full-time education in the previous year, *and mindful of the fact that education participation decisions are made over a 2 year cycle between 16 and 18*, the analysis suggests that:

- Individuals living in areas with a higher adult unemployment rate tend to stay in full-time education and tend not to leave full-time education to enter employment.
- The probability of moving from full-time education to NEET between the age of 17 and 18 seems to be (weakly) positively associated with a higher adult unemployment rate and (weakly) negatively associated with a higher youth unemployment rate.
- The adult wage gap has a positive effect on the probability of staying in full-time education at both ages and a negative effect on the probability of moving to employment or becoming NEET, although the effects are seldom statistically significant.

## The extent of unpaid or low-paid internships

- To understand the incidence of unpaid or low-paid internships, we accessed the 2011-12 and 2012-13 HESA **Destinations of Leavers from Higher Education** (DLHE) data. The analysis found that six months post-graduation, there are approximately **212,500** graduates per annum, of which approximately **2%** were engaged in internships (i.e. **4,150** per annum). Our analysis suggests that the **lower bound** estimate of the proportion of interns not receiving the relevant minimum wage stands at approximately **13-16%** (though possibly much higher as a result of the classification of earnings information associated with unpaid internships).

  At industry level, 'Human health and social work activities' and 'Arts, entertainment and recreation' were the industries with the highest share of interns being paid below the relevant minimum wage. However, these were also the industries with the highest incidence of unreported or unclassified earnings, which suggests that the incidence of unpaid or low-paid internships could be substantially higher (although still small in absolute terms).

## Overall conclusions

**Given the results of the analysis, our conclusion is that the relative freeze in the minimum wages benefitted the employment outcomes of eligible young people, while the change in the threshold age of entitlement had no detrimental effect on the employment outcomes of young people. Our analytical assessment is that there is no evidence to warrant a policy change in the current age bands of the UK National Minimum Wage.**

# 1 Introduction and terms of reference

London Economics were commissioned by the Low Pay Commission to undertake an analysis of various issues relating to the impact of the minimum wage on young people. In particular, there were three dominant areas of research:
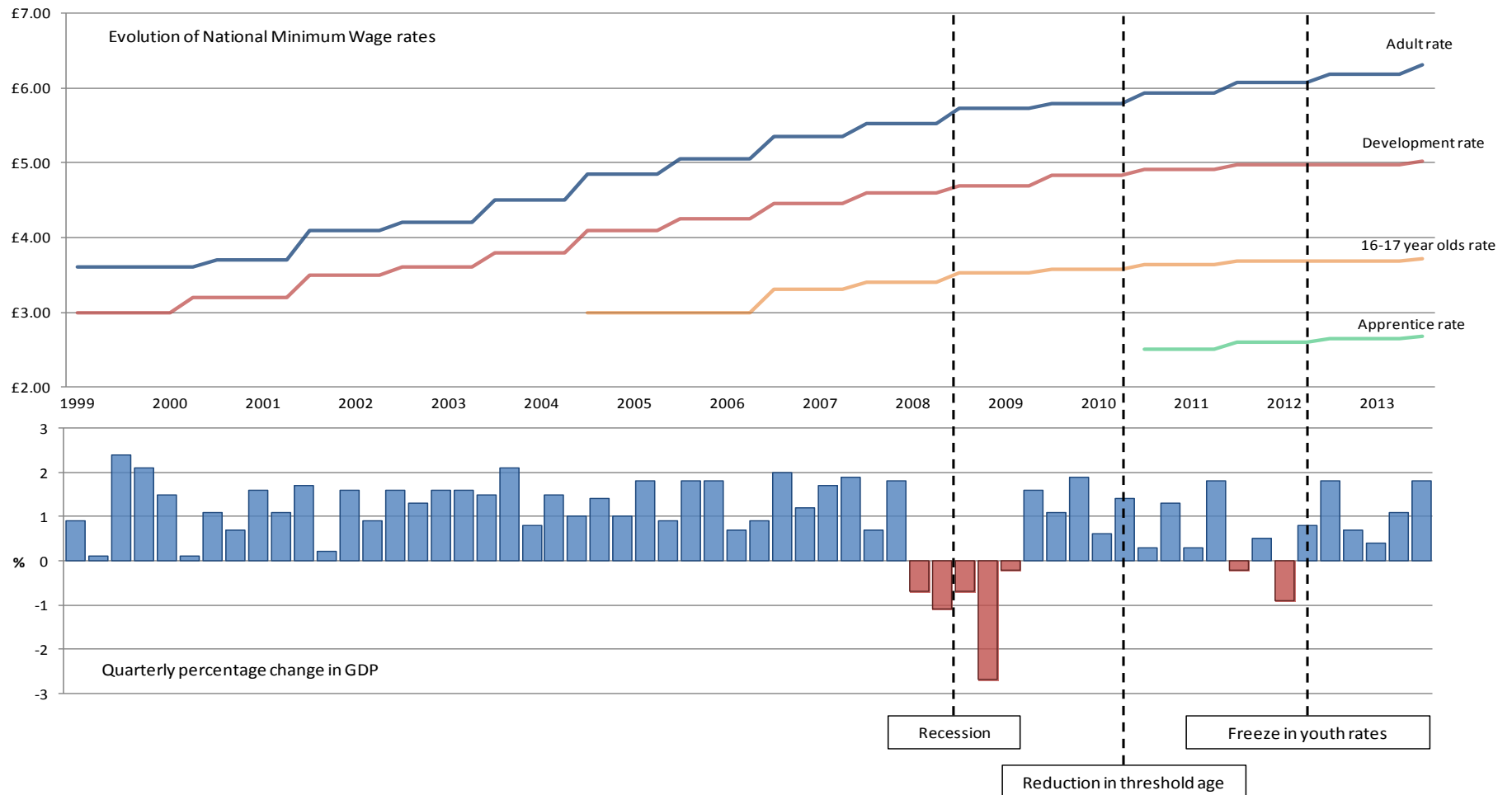
- The first element of the analysis (*Research Objective 3* presented in Table 1) builds on previous research in the area to better understand whether the freeze in the Youth Development Rate and 16-17 Year Old Rate that occurred from 2011 (relative to the adult rate of the National Minimum Wage - presented in Figure 1) maintained employment levels. In addition, the analysis assessed whether the relatively higher jump in the appropriate minimum wage for young people upon reaching the adult threshold affected subsequent employment rates.
- The second element of the analysis (*Research Objective 4*) considers the impact of the reduction in the threshold age for the adult national Minimum Wage that occurred in October 2010 and the labour market implications this had for young people aged between the old and the new age thresholds.
- The third main element of the analysis explores the impact of raising the education participation age on the determinants of undertaking education and training, and the extent to which local labour market conditions affect the labour force participation of young people

The original research objectives proposed by the Low Pay Commission are presented below, of which only Research Objective 2 was *not* considered as part of this analysis.

| Table 1: | Research Objectives |
|---|---|
| RO1 | Provide a clear understanding of the use of youth rates;<br>Investigate how the use of youth rates has changed over time;<br>Explore the current relativities of the youth rates relative to each other and the adult rate; |
| RO2 | Is there any evidence of job substitution between age groups as a result of these relativities |
| RO3 | Investigate the impact of the recent freeze in the minimum wages of young people |
| RO4 | Investigate the impact of reducing the age of entitlement for the adult rate to 21 |
| RO5 | Investigate international evidence to assess whether the UK can learn from the experience of others when changing age entitlements to the minimum wage |
| RO6 | Assess whether there is evidence to support the current age bands of the UK NMW |
| RO7 | Provide a clear understanding of the extent of unpaid internships; |
| RO8 | Understand the determinants of undertaking education and training:<br>– identifying the main determinants in the decision to participate in education or training, and the importance attached to the level of wages;<br>– exploring if these factors are more important for some groups of young people than others;<br>– investigating whether the level of wages affects the proportion of young people who are inactive, and not in education or training; and<br>– assessing whether the present minimum wage age groups would still be appropriate |

Section 2 of this report sets out the wider evidence relating to the impact of age-related minimum wages on young persons' labour market outcomes, while Section 3 presents the impact of the relative freeze in the Youth Development Rate on labour market outcomes. Section 4 considers the impact of the reduction in the age-eligibility threshold for the full adult minimum wage on outcomes, while Section 5 assesses the prevalence of unpaid internships. Section 6 provides evidence relating to the implications for the NMW of raising the participation age in England, while Section 7 concludes. Detailed econometric results are presented in the Annex.

**Figure 1:  Evolution of UK Hourly NMW rates and Quarterly Percentage Change in GDP, 1999-2013**



Evolution of National Minimum Wage rates

Adult rate

Development rate

16-17 year olds rate

Apprentice rate

Quarterly percentage change in GDP

Recession

Reduction in threshold age

Freeze in youth rates

*Source: Office of National Statistics, Low Pay Commission*

# 2 Evidence relating to the impact of age related minimum wages on labour market outcomes (RO5)

## 2.1 The impact of minimum wages on employment outcomes

The impact of minimum wages on employment outcomes is one of the most widely-researched, yet inconclusive topics in labour economics. Until the 1980s, the prevailing opinion was that a wage floor *reduces* employment, especially for younger and low-skilled workers. This opinion was informed both by classical theoretical supply-and-demand models and by early time-series empirical analysis (Brown, Gilroy and Kohen, 1982).

However, a series of empirical analysis conducted by Card (1992) and Card and Krueger (1994), through a quasi-experimental analysis of cross-sectional and panel data, could *not* find a negative impact of minimum wages on employment for young and low-wage workers in the United States. Their approach and results have been questioned ((Burkhauser, Couch and Wittenburg (2000); Neumark and Wascher (2000)), which has re-opened the debate on the impact of the minimum wage on employment outcomes. The research in this field has since evolved, alongside the availability of larger longitudinal datasets and advances in econometric techniques, allowing more reliable impact identification.

In their extensive review of existing literature, Neumark and Wascher (2007) conclude that the majority of research evidence from the US as well as other countries points to a **negative** employment effect of introducing and increasing the minimum wage. Since younger and relatively unskilled workers are the most likely to be affected by a minimum wage, the adverse impact on youth employment is partially mitigated by a specific youth minimum wage rate. However, various studies have produced a very wide range of estimated minimum wage impacts on employment, both positive and negative. Other studies by Dolado et al (1996), Card and Krueger (1995) and Doucouliagos and Stanley (2009) also find conflicting evidence on whether minimum wages have a positive or a negative, or any, impact on employment. In contrast, recent analysis by Gulliano (2013) finds a positive impact of increases in relative wages of young people on relative employment outcomes.

In the United Kingdom, the National Minimum Wage (NMW) was introduced in April 1999. Overall, little evidence has been found of a negative impact of the NMW on employment. However, measuring such impact poses certain methodological challenges. The NMW is legislative, and as such, it should cover everyone in the country above the age of 16[1], which results in the lack of an appropriate or 'sufficient' sub-population of workers unaffected by the NMW as a counterfactual. Research has attempted to adopt a differential impact approach by comparing employment outcomes of NMW-bound workers to those of workers with slightly higher wages (Stewart, 2004), or to those in geographic regions where the NMW 'bite' is smaller (Dickens, Riley and Wilkinson, 2010 and Dolton, Bondibene and Wadsworth, 2009). Stewart (2004) investigates the effect of the introduction of the NMW on employment, using an individual-level panel data set. He compares employment rates between workers at different parts of the wage distribution, whilst accounting for variable employment responses to macroeconomic factors. Later, Dickens and Draca (2005)

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[1] The national minimum wage was first introduced in 1999 for workers 18 or older; as of 2004, it also captures workers above the school leaving age.

look into the effect of annual increases of the NMW. Both studies find **no statistically significant negative effect attributable to the NMW on any demographic group**. The most notable exception that has found a significant negative impact is the one by Dickens, Riley and Wilkinson (2012), who concluded that the introduction and annual increases of NMW *reduced* the employment rate of **part-time female workers**, for whom the minimum wage is particularly binding.

## 2.2 The impact of minimum wages on young people's employment outcomes

The literature on the impact of minimum wage policies on the youth labour market is scarcer. Croucher and White (2011) have summarised research evidence on the topic from 11 different countries and over 60 papers to conclude that results are inconsistent. The majority of studies point at small effects, which are most often of weak or with no statistical significance. When such existing effects are negative, they tend to be very small, sensitive to the model specification, and diminishing over time as the worker becomes older. In some cases, the effects of minimum wages on youth employment are found to be positive, but again not robust, especially when the available data spans over a longer time period. A negative non-employment effect (i.e. unemployment plus inactivity) is found most often in countries without a youth or development rate lower than the adult one, and such an effect might be mitigated by youth rates being set at an appropriate level.

In the United Kingdom, a Youth Development Rate was introduced simultaneously with the adult rate in 1999, and applied to young workers between ages 18 and 21 inclusive[2]. A youth NMW rate for 16-17 year old workers was introduced in 2004, the 16-17 Year Old Rate. Since then, research on the sign and magnitude of the effects of different NMW policies on young workers has not been unanimous and often varies with the empirical approach adopted.

Research has more recently favoured two empirical methodologies for analysis of the NMW on youth employment – the *difference-in-differences* and the *regression discontinuity designs*. They both have certain advantages as well as some limitations. A difference-in-differences approach is informative when comparing two groups, one of which is subject to the policy and the other one is not, over a sufficiently long period of time *both* before and after the policy implementation. Potential problems with this econometric method stem from the main assumption, namely that had there been no policy change, the two groups' employment outcomes would have evolved in a similar manner. However, this is not necessarily the case, particularly in the labour market, as structural changes may be largely dependent on macroeconomic and industry-specific factors.

In contrast, the benefit of the regression discontinuity approach is that the underlying characteristics of the two groups compared – for instance, workers just under 22 to workers just over 22 – are likely to be very similar. The only difference between the two groups should be their age by a few months, over which individuals have no control. However, the interpretation of the regression discontinuity results is limited to a local and short-term effect with a very small age interval around a 'cut-off' or 'eligibility' age, due to the nature of the specification. Additionally, in the application of the NMW, the cut-off age of workers is deterministic to treatment and hence, every worker will eventually be treated. Thus, the increase in the NMW can be anticipated by employers prior to the employees arriving at the cut-off age, which can influence their hiring-and-firing decisions.

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[2] The eligibility age for the adult rate dropped from 22 to 21 in October 2010.

Crawford et al (2011) have extended a study by De Coulon et al. (2010) to examine the impact of the youth and development wage rates on 16- to 18-year-olds in the United Kingdom. They use data from the Labour Force Survey and the Annual Survey of Hours and Earnings between 2000 and 2010. First, a *maximum likelihood* methodology is used to estimate the relative probabilities of various employment outcomes, and then a difference-in-differences estimation strategy is adopted to compare the gap in impact between teenagers (16-17) in low-earning areas versus those in high-earning areas. The authors find *no statistically significant impact* of the Youth Development Rate on young people at the age of 18. However, they do acknowledge the existence of other potentially important factors that cannot be controlled for with the identification strategy adopted. When looking into the 16-17 age group, the study finds a positive and statistically significant impact of the youth minimum wage rate on the probability of full-time students working in low-wage areas relative to high-wage areas. However, no impact of the youth rate is found on the probability of working if not in full-time education, the probability of being economically inactive, or the probability of staying in full-time education. This implies that the youth wage rate has not triggered any switching effects between full-time work and study; however, it may have encouraged young people already in full-time study to take up a part-time job.

Dickens, Riley and Wilkinson (2010) utilise the fact that at the age of 22[3], workers' pay undergoes a transition from the Youth Development Rate to the adult rate of the National Minimum Wage, to examine the impact from this transition on employment, unemployment and economic inactivity of low-skilled individuals. Since age eligibility for the NMW is exogenously determined by legislation, it has a deterministic impact on the binding minimum wage levels, creating a **jump** between the Youth Development Rate and adult NMW wage rates of about 20%. This allows the authors to adopt a regression discontinuity design on panel data from the Labour Force Survey between 1999 and 2009, comparing employment outcomes driven by the NMW difference for workers a few months below the age of 22 to those a few months above the age of 22[4]. The authors find a **statistically significant increase in the employment rate of low-skilled workers** of 5 percentage points at the age of 22. Around 40% of this effect is accounted for by a decrease in mostly male unemployment, and the rest – by a decrease in (mostly female) inactivity. The results are robust to various specifications and falsification tests.

Fidrmuc and Tena (2013) extend the Dickens et al (2010) study, capitalising on the same natural quasi-experimental setting for a regression discontinuity design. They also use the fact that young workers earning the 16-17 Year Old Rate or the Youth Development Rate are subject to a sharp wage increase upon turning 18 or 22[5] respectively, but their productivity is unlikely to jump in the same way. Unlike the study by Dickens et al (2010) however, this study considers all workers, not only the low-skilled ones, arguing that young workers are more likely to be bound by the minimum wage regardless of their skill level.

The paper, in contrast to Dickens et al (2010), does not find that the increase in the NMW rate triggered by turning 22 has a significant impact on employment. They find that the likelihood of male workers to be employed is lower aged 21, which might be due to employers anticipating the

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[3] The study uses data prior to the 2010 change in age eligibility for the adult NMW from 22 to 21.

[4] The authors do not perform analysis on workers around the age of 18, who might be affected by other structural changes at the same time. Such structural changes could be changes in benefits eligibility, abolishment of restrictions on certain types of employment or changes in education participation.

[5] The study uses data prior to the 2010 change in age eligibility for the adult NMW from 22 to 21.

higher NMW rate they will face. A negative effect of the Youth Development Rate is found on the employment outcomes of those turning 18, both for male and female workers. The analysis, however, uses groups of workers up to fifteen months younger and older than the cut-off ages for change in NMW rate, which is a wide interval for regression discontinuity design.

Olssen (2011) performs a similar study using a regression discontinuity design to determine the impact of a youth minimum wage on the 19, 20 and 21-year-olds' employment outcomes in the Australian labour market. The minimum wage in Australia varies by state, occupation and age, and is determined by an awards scheme (as of 2009, there were over 1,500 different awards), as well as a National (previously Federal) Minimum Wage, which covers any worker not captured by a specific Award. The youth minimum wage starts at the age of 15 or 16, and grows by 10% per year up to the age of 21, when the adult minimum wage rate begins to apply. Young workers are not covered by the National Minimum Wage, but only by the specific awards. All this makes the Australian environment more complex than the UK. Due to the numerous awards schedules and the fact that not all professions have a youth minimum rate, the only way to identify if a young person receives a youth minimum wage is during their HILDA[6] interview. Thus, the data used in the study is prone to a high measurement error. The impact of the 10% step in the wage floor on hours of employment is found to be positive but statistically insignificant for workers aged 19, and statistically insignificant and not robust to the econometric specification for those aged 20 and 21. A robust and statistically significant positive change in hours is only found for 21-year-olds. Overall, there is no sign of an adverse impact of the minimum wage on young workers in Australia.

## 2.3    Impact of changes in the minimum wage on young people's employment outcomes

Little international research has been conducted on the impact of specific youth or development minimum wage policy changes on youth employment outcomes, partially due to how rare and recent such policy changes might be. To our knowledge, apart from the United Kingdom, the most notable example of a country with such policy changes, where their consequent impact has been investigated, is New Zealand. Over the past decade, the youth labour market in New Zealand has experienced change in the eligibility criteria for a youth minimum wage, as well as relative increases in the youth minimum rate compared to the adult one.

The youth minimum wage in New Zealand was introduced together with the adult rate in 1994 and applied to workers between the ages of 16 and 19. It was set at 60% of the adult minimum wage rate, until March 2001, when two important policy changes were implemented. Firstly, the adult minimum wage eligibility age dropped from 20 to 18 years, which meant that the youth minimum wage started only applying to 16-17 year-olds. In effect, this represented a 69% increase in the minimum wage for the 18-19 year olds. Secondly, the youth minimum wage rate for 16-17 year olds was increased as a proportion of the adult rate from 60% to 80%, in two steps of 10 percentage points. This resulted in a 41% increase in the minimum wage for 16-17 year olds over 2 years.

Hyslop and Stillman (2004) investigate the impact of the age eligibility change on 18-19s and that of the relative minimum wage increase on 16-17s, by comparing their employment outcomes to those of the 20-25s, who are unaffected by the policy change, through a difference-in-differences

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[6] The Household, Income and Labour Dynamics in Australia survey.

regression analysis. The authors use 1997-2003 quarterly data from the New Zealand Household Labour Force Survey on employment, hours worked, participation in education, unemployment and inactivity, and annual data from the survey's Income Supplement on wages, non-student benefits, weekly earnings and weekly income, weighting the data to maximise the sample representativeness of the population. The specification controls for other covariates and age-specific time effects, and tests the direct impact on the 16-17 and 18-19 age groups' outcomes while allowing for spill-over effects on the and 20-21s.

The analyses find a small and overall **positive** but statistically insignificant effect on employment of both groups, which is inconsistent across time periods. The average hours worked by the employed 16-17s increases as a result of the policy change, but there is no such effect found on the 18-19 year olds or 20-21 year olds. However, there is a statistically significant increase in unemployment and on economic inactivity for the 16-17 year olds, and no such impact on the 18-19 year olds. There is also an adverse impact on study enrolment rates from the policy changes both on the 16-17 year olds and on the 18-19 year olds for the first two post-policy years. Although the results are very sensitive to the specification chosen, there is overall no robust evidence of negative effects on youth employment and hours worked.

In 2008, the youth minimum wage rate in New Zealand was abolished and instead, a 'new entrants' minimum wage (NEMW) was introduced. The NEMW still amounts to 80% of the adult rate, and still applies to the 16-17 year olds age band, however only for the first three months (or 200 hours) of their employment. Effectively, as Hyslop and Stillman (2011) show, this change represented another 28% increase in the real value of the minimum wage for the 16-17 year old age group. The authors take a difference-in-differences approach to test the impact of the policy reform, comparing employment outcomes of the 16-17 year olds to those of the 20-21 year olds. The choice of control group is dictated by the large spill-over effects of the policy change on 18-19 year olds, which means that they do not meet the key requirement of the difference-in-differences approach.

Hyslop and Stillman (2011) find no immediate adverse youth employment effects after the 2008 reform in New Zealand. However, they find a negative effect on the employment rate of 16-17 year olds in the two post-policy years. These results are based on a pooled sample of both students and non-students, however when only looking into young people not in education, there is a slight positive effect on their employment rate. In addition, the overall economic activity level of 16-17 year olds is estimated to have increased. There have been some employment substitution effects from 16-17 year olds towards 18-19 year olds, mostly contained within the student population.

It is worth noting, however, that many of these recent policy changes on the labour market in various countries have happened at a time of unstable macroeconomic conditions, which inevitably has an impact on employment outcomes. However, to our knowledge, there have been few cross-country studies which capture macroeconomic factors such as economic growth or recession.

Dolton and Bondibene (2011) have performed one such study, in which they find that if the size of a country's labour market is accounted for, then any negative impact from minimum wages on employment, if found, is not robust. They use panel data from 33 OECD countries between 1976 and 2008 to evaluate the impact of minimum wages on the rate of employment using cross-country and time variations in the 'bite' of the minimum wage. The authors apply population weights, control for market supply and demand effects and country-specific labour policies, and

allow for country and time fixed effects. They find that the previously estimated negative effect of the minimum wage on adult employment loses its statistical significance, decreases in magnitude and changes sign. This result implies that overall, there is no difference in employment between countries where the minimum wage is more binding and where it 'bites' less. Additionally, there is no statistically significant impact of minimum wages found on youth employment (15-24 years), but some positive impact on employment of 15- to 19-year-olds.

The authors also find no difference in the impact of a minimum wage on adult (over 25s) and teenage (15-19s) employment across the economic cycle. However, they find some evidence that the impact of a minimum wage on youth employment (15-24) is more detrimental during times of economic downturn than otherwise.

In summary, the majority of recent international research finds no conclusive evidence of significant adverse effects of youth-related minimum wage policies on youth employment. However, any potential impact often varies with the specifics of the implemented policy and the overall state of the economy in the affected country.

# 3 Impact of the recent freeze in the minimum wages on young people (RO3)

## 3.1 Background and context

Since its introduction, the National Minimum Wage (NMW) for individuals aged between 18 and 21 (or 22[7]) increased every year with year-on-year changes ranging from 1.3% to 9.4% per annum. However, in October 2012, the minimum wage rates for young people (i.e. the 16-17 Year Old Rate and the Youth Development Rate) were frozen for the first time, whereas the adult rate of the NMW continued to rise. Therefore, when young people qualify for the adult rate, they experience a larger wage increase than before the freeze in the Youth Development Rate.

In this chapter, we consider two key questions:

1) First, did the freeze in the minimum wages for young people impact employment rates for those eligible? More specifically, following the economic recession and the decline in employment opportunities for young people, did the relative slowdown in the 16-17 Year Old Rate and the Youth Development Rate in some way stabilise the level of employment amongst potential recipients?
2) Secondly, did the freeze in the Youth Development Rate have an effect on labour market outcomes for individuals becoming eligible for the adult rate of the national minimum Wage?

The first question is addressed using a descriptive analysis examining the evolution of employment rates before and after each uprating for individuals qualifying for the 16-17 Year Old Rate and the Youth Development Rate from 2003 to 2013. In addition, a difference-in-differences analysis is carried out to determine whether any employment effects during the slowdown and freeze in the youth rates are statistically significant for individuals aged between 16 and 20 (compared to 21 and 22 year olds).

The second question is addressed using more sophisticated econometric modelling. The threshold age for the adult rate provides a 'quasi-experimental' setting as we can treat individuals either side of the threshold age as being similar in all ways, except those above the threshold age receive a higher wage. More specifically, in this sub-section, we utilise a **regression discontinuity approach** to analyse the impact of the freeze in the Youth Development Rate relative to the adult rate of the National Minimum Wage on labour market outcomes for young people.

This work builds on the study by Dickens et al (2010) by examining how the impact of changes in the eligibility to the adult rate varies by gender and level of qualification of the individual. However, as an extension, we estimate our model separately for two different periods:

(i) October 2006 to September 2011 - the uplift in the minimum wage on becoming eligible for the Adult rate was steady at around 20% - the *'lower-jump'* period, and;

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[7] In October 2010, the entitlement age for the adult minimum wage was lowered to 21 from 22. This report covers time periods before and after the change in the entitlement age.

(ii) October 2011 to September 2013 – the uplift in the minimum wage was considerably higher as a result of the freeze in the Youth Development Rate - the *'higher-jump'* period.

This allows us to examine whether the impact at the threshold age on labour market outcomes has changed given the changes in the relative rates (Adult and Youth Development). We also examine whether the impact of the minimum wage increase at the threshold age has been affected by the poor economic performance since the 2008 recession. To do this, we divide the data into "before" and "after" the beginning of the 2008 recession.

The remainder of the chapter is organised as follows. Section 3.2 investigates the impact of the freeze in the 16-17 Year Old Rate and the Youth Development Rate on employment for those eligible. Section 3.3 contains the econometric analysis of the impact of the freeze in the Youth Development Rate on labour market outcomes for individuals becoming eligible for the adult rate of the NMW. Section 3.4 concludes.

## 3.2    Did the freeze in youth rates maintain employment levels?

Before proceeding to the econometric analysis, we provide a descriptive analysis of the impact of the freeze in the minimum wage rates for young people. More specifically, this analysis provides some insight into the impact of the freeze in the youth rates on labour market outcomes for all individuals who qualify for either the 16-17 Year Old Rate or the Youth Development Rate.[8]

Our sample pools observations by year (running from October to September) as proposed changes to the minimum wage rates occur on the 1st of October each year. Within these groups, individuals who are eligible for the 16-17 Year Old Rate or the Youth Development Rate are identified. Hence, observations may appear more than once in each group.

Figure 2 and Figure 3 show the trend in the basic economic activity for individuals eligible for the Youth Development Rate or the 16-17 Year Old Rate between December 2002 and September 2013. The two vertical dashed lines represent the beginning of the recession in 2008 and the freeze in the two youth rates in October 2012.

Compared to a decline in employment between 2007-08 and 2011-12 from **56%** to **45%**, the freeze in the Youth Development Rate appears to have stabilised the average employment rate for qualifying  individuals - remaining fairly stable around **45%** since the freeze. Similarly, compared to a decline in employment between 2007-08 and 2011-12 from **32%** to **22%**, the freeze in the 16-17 Year Old Rate appears to have also stabilised the average employment rate for qualifying individuals - standing at approximately **21%** since the freeze.

However, it is important to note that although the freeze in the two youth rates occurred in 2011-12, the rate of increase of the two youth rates - relative to the adult rate of the National Minimum Wage - was significantly less in October 2011 (and October 2013). The analysis suggests that the slowdown in the 16-17 Year Old Rate and the Youth Development Rate did indeed stabilise employment rates amongst young people following a significant decline during the recessionary period.

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[8] This differs from the following econometric analysis which examines the impact of the freeze on individuals who are around the age of becoming eligible for the adult rate.

We also replicated the analysis focusing on individuals with 'low' qualifications only (individuals with highest qualification at or below 5 or more GCSEs at grades A*-C). The results remain consistent with those presented above, and this information is shown in Figure 9 in the Annex.

**Figure 2:  Economic activity of young people from 2003 to 2013**
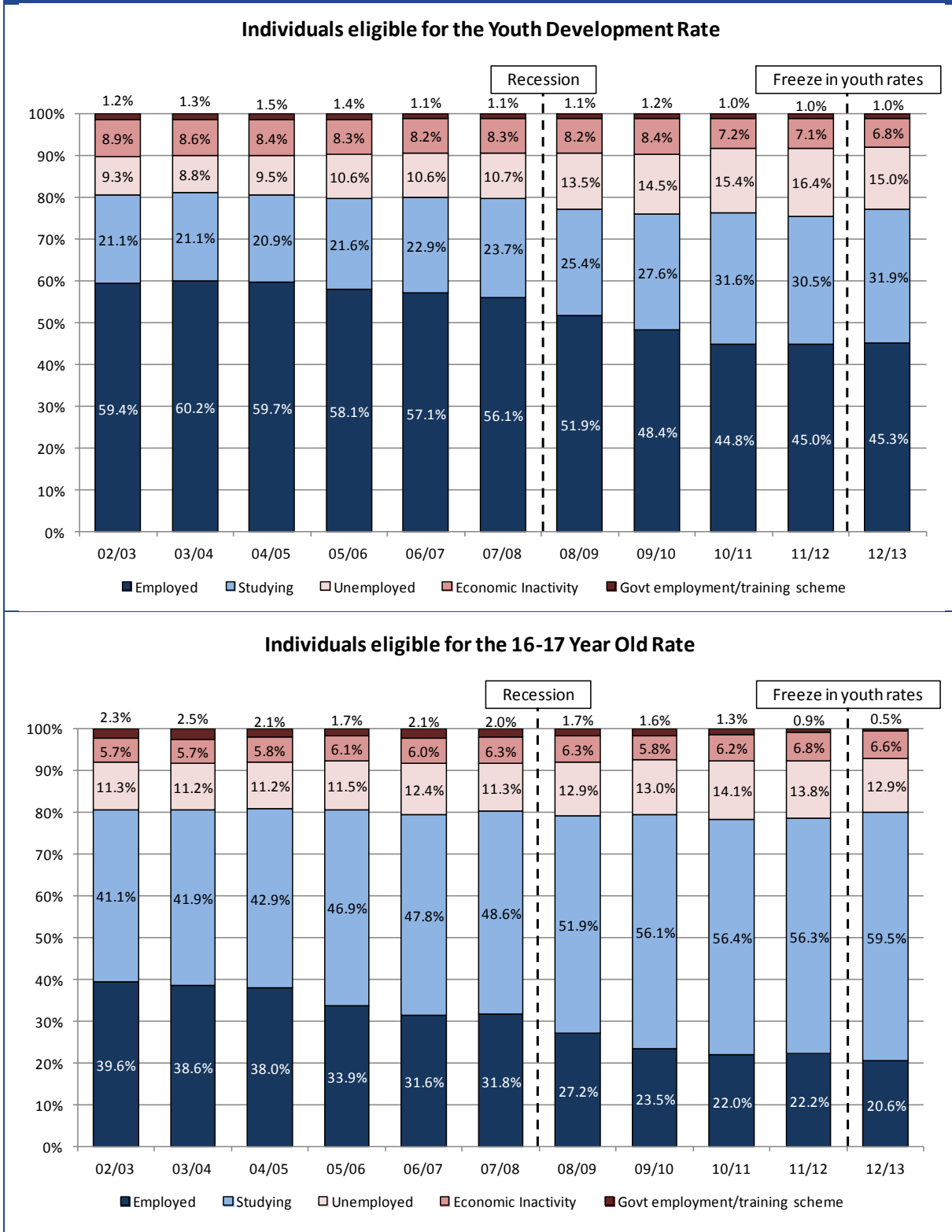
Note: Analysis excludes self-employed and unpaid family workers.
*Source: London Economics' analysis using Labour Force Survey*

### *Tracking individuals on specific young persons' rates over time*

Ideally, tracking each individual who is eligible for the same National Minimum Wage rate before and after each uprating may provide a clearer depiction of how average employment rates change following changes in minimum wage policy. However, clearly, the robustness of the results from this approach relies on sufficient sample sizes in each year.

For each individual eligible for a particular rate before and after the uprating in October of each year (i.e. 16 year olds on the 16-17 Year Old Rate and 18-19 year olds on Youth Development Rate), we have taken the last observation before the uprating in October[9] and then take the first observation for the same individual after the minimum wage uprating. Aggregating across individuals, we calculate the average employment rate before and after each uprating. Table 2 below captures average employment rates for the same set of individuals who remain eligible for the 16-17 Year Old Rate or the Youth Development Rate either side of the October uprating in each year.

| Table 2: | Average employment rates for the same set of individuals before and after a change in the 16-17 Year Old Rate or the Youth Development Rate | | | | | |
|---|---|---|---|---|---|---|
| Year of uprating | 16-17 Year Old Rate | | | Youth Development Rate | | |
| | Before | After | Observations | Before | After | Observations |
| 2003 | 37.1% | 46.5% | 2,155 | 62.2% | 63.2% | 3,325 |
| 2004 | 38.4% | 46.8% | 2,163 | 63.8% | 62.6% | 3,176 |
| 2005 | 35.2% | 41.6% | 2,057 | 62.8% | 61.6% | 3,059 |
| 2006 | 31.1% | 40.4% | 1,961 | 60.8% | 62.3% | 3,019 |
| 2007 | 30.1% | 39.6% | 2,059 | 60.7% | 61.1% | 3,076 |
| 2008 | 29.0% | 36.6% | 1,923 | 57.7% | 57.4% | 3,029 |
| 2009 | 22.9% | 29.1% | 1,832 | 52.2% | 52.4% | 2,922 |
| 2010 | 21.2% | 27.7% | 1,701 | 50.0% | 49.4% | 2,114 |
| 2011 | 19.9% | 26.6% | 1,509 | 46.6% | 47.3% | 2,008 |
| 2012 | 22.4% | 26.8% | 1,528 | 47.7% | 50.0% | 1,875 |

Note: Analysis excludes self-employed and unpaid family workers.
*Source: London Economics' analysis using Labour Force Survey*

As shown in Table 2, the change in the employment rate before and after the uprating have generally increased for individuals eligible for the 16-17 Year Old Rate (ranging from 4.4 to 9.5 percentage points). In contrast, from the onset of the recession (2008 to 2010), the average employment rates for individuals qualifying for the Youth Development Rate have declined marginally following the October uprating; however, since the slower growth in the Youth Development Rate relative to the adult rate of the National Minimum Wage in October 2011, and subsequent freeze in the in the Youth Development Rate in October 2012, employment rates have *risen*, thereby restoring the historic patterns of increasing employment.

[9] In most cases, is recorded in the second quarter of the year

### 3.2.1   Difference-in-differences analysis

The descriptive analysis in the previous section suggests that employment rates were not adversely affected by the slower growth in the two youth rates relative to the adult rate of the NMW. Moreover, by tracking the same individuals before and after the various upratings in October 2011 and 2012, the analysis shows an increase in employment rates for young people. In this section, we use a **difference-in-differences** estimation to empirically test if this positive impact is statistically significant.

### 3.2.2   Methodology

Under the difference-in-differences specification, the treatment group comprises individuals aged between 16 and 20 (i.e. individuals who were subject to the slowdown and subsequent freeze in the youth rates), while the control group comprises individuals aged between 21 and 22. The estimation is performed over three different periods:

(i) *Impact of the slower growth and subsequent freeze* – Under this setting, the data covers the period from October 2010 to September 2013 - the 'before' period covers observations from October 2010 to September 2011, and the period between October 2011 and September 2013 represents the 'after' period.

(ii) *Impact of the implementation of the freeze* – The model is estimated between October 2011 and September 2013, where the freeze was introduced in October 2012. The 'before' period runs from October 2011 to September 2012 and the 'after' period from October 2012 to September 2013.

(iii) *Impact of the announcement of the freeze* – The estimation period is the same as in (ii); however, the 'before' period runs from October 2011 to March 2012 and the 'after' period from April 2012 to September 2013.

The dependent variable is binary, and equals one if the individual is employed and zero otherwise. Therefore, a probit model is used for the estimation. More formally, the estimating equation has the following form:

$$y_i = \beta_0 + \beta_1 * \text{period}_i + \beta_2 * \text{treat}_i + \beta_3 (\text{period}_i * \text{treat}_i) + \gamma X_i + \varepsilon_i,$$

where $y_i$ is the probability of employment for individual *i*; $\text{period}_i$ is a dummy variable which is equal to one if the treatment has come into effect and zero otherwise; $\text{treat}_i$ is a dummy variable which is equal to one if individual *i* is in the treatment group and zero if they are in the control group; $X_i$ is a vector of additional covariates; and $\varepsilon_i$ is the error term. $\beta_3$ is the coefficient of interest, measuring the percentage point change in the average employment rate for individuals in the treatment group relative to individuals in the control group.

In addition, we also test the impact on those eligible for the 16-17 Year Old Rate and the Youth Development Rate separately by redefining the treatment group to capture the relevant individuals. The control group in these cases remains individuals aged 21 or 22. The following table shows the average employment levels for the treatment and control groups in the 'before' and 'after' periods for the three different estimation periods mentioned above. Similar tables for males, females and 'low-skilled' individuals are provided in the Annex.

| Table 3: Average employment rates for the treatment and control groups; All individuals | (i) | | (ii) | | (iii) | |
|---|---|---|---|---|---|---|
| | 'Before' | 'After' | 'Before' | 'After' | 'Before' | 'After' |
| Control group (21 and 22 year olds) | 59.1% | 57.8% | 56.7% | 58.9% | 55.7% | 58.5% |
| Treatment group | | | | | | |
| – 16 to 20 year olds | 35.1% | 34.9% | 35.2% | 34.6% | 34.2% | 35.2% |
| – 16 to 17 year olds | 21.9% | 21.4% | 22.2% | 20.6% | 22.0% | 21.2% |
| – 18 to 20 year olds | 44.8% | 45.1% | 45.0% | 45.3% | 43.1% | 45.9% |

Note: (i) Impact of the slower growth and subsequent freeze, (ii) Impact of the implementation of the freeze and (iii) Impact of the announcement of the freeze

*Source: London Economics' analysis using Labour Force Survey*

### 3.2.3 Data

The data used to estimate the model is derived from the Special Licence Labour Force Survey (LFS). The LFS is the official survey in the United Kingdom recording labour market outcomes in each quarter with around 100,000 respondents per quarter. To ensure we have a sufficient sample for each age and in each period, observations are pooled together.

It should be noted that the difference-in-differences specification relies on the assumption of common trends between the treatment and control group in the absence of the treatment. Therefore, it is assumed that in the absence of the freeze in the two youth rates, employment rates for individuals aged between 16 and 20 and those aged 21 and 22 would have followed a similar pattern. This assumption is not directly testable; however if it fails to hold, results may be an under- or over-estimate of the true impact.

### 3.2.4 Results

In this section, we present the results from the difference-in-differences analysis examining the impact of the slowdown and subsequent freeze in the two youth rates on the probability of employment for young people. Initial findings focus on the joint impact of the slower growth and freeze in the two youth rates relative to the adult rate of the NMW, before considering the impact of the freeze on its own.

*Impact of the slowdown and subsequent freeze*

Table 4 shows the initial results which group individuals aged 16 to 20 (i.e. individuals eligible for the 16-17 Year Old Rate and the Youth Development Rate) and compares their probability of employment to individuals aged 21 and 22. The reported coefficients are marginal effects of $\beta_3$ from the above specification.

The results suggest that there is strong evidence (at the 1% significance level) of a positive impact on employment rates for young people. More specifically, individuals aged between 16 and 20 were **2.5 percentage points more likely to be employed** compared to individuals aged 21 and 22 as a result of the slowdown and freeze in the two youth rates. A similar positive impact is achieved when the estimation is carried out by gender and for 'low-skilled' individuals (those with highest qualification at or below 5 or more GCSEs at grades A*-C).

| Table 4: | Impact of the freeze on 16-20 year olds | | | |
|---|---|---|---|---|
| **Treatment group 16-20 year olds; control group 21-22 year olds** | | | | |
| | (1) All | (2) Men | (3) Women | (4) Low-skilled |
| Impact of slowdown and freeze | 0.025*** (0.008) | 0.028** (0.012) | 0.024** (0.012) | 0.027** (0.013) |
| Observations | 67,458 | 33,573 | 33,885 | 33,303 |

Note: Reported coefficients are marginal effects. Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

To identify if these results may be driven by either individuals eligible for the 16-17 Year Old Rate or those qualifying for the Youth Development Rate, the above analysis is repeated by re-defining the treatment group to represent one of the two youth rates. Table 5 and Table 6 show the results for individuals eligible for the 16-17 Year Old Rate and those eligible for the Youth Development Rate, respectively.

There is statistically significant evidence (at the 5% significance level) indicating that males eligible for the 16-17 Year Old Rate were **5.6 percentage points more likely to be employed** compared to 21 and 22 year olds following the slower growth in the 16-17 Year Old Rate from October 2011. A positive impact is also reported for females; however it is not statistically significant. Also, focussing on 'low-skilled' individuals only, there is a positive employment effect of **3.9 percentage points**, which is statistically significant at the 1% level.

| Table 5: | Impact of the freeze on those eligible for the 16-17 Year Old Rate | | | |
|---|---|---|---|---|
| **Treatment group 16-17 year olds; control group 21-22 year olds** | | | | |
| | (1) All | (2) Men | (3) Women | (4) Low-skilled |
| Impact of slowdown and freeze | 0.036*** (0.011) | 0.056** (0.015) | 0.020 (0.016) | 0.039*** (0.014) |
| Observations | 35,194 | 17,474 | 17,720 | 19,547 |

Note: Reported coefficients are marginal effects. Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

In general, the results are similar for individuals eligible for the Youth Development Rate, although there is some difference in statistical significance. For example, there is a positive and statistically significant effect on employment prospects for females eligible for the Youth Development Rate (**2.5 percentage points** compared to 21 and 22 year olds during the period of the freeze in the Youth Development Rate). The impact on 'low-skilled' individuals qualifying for the Youth Development Rate is positive but not statistically significant.

| Table 6: | Impact of the freeze on those eligible for the Youth Development Rate | | | |
|---|---|---|---|---|
| **Treatment group 18-20 year olds; control group 21-22 year olds** | | | | |
| | (1) All | (2) Men | (3) Women | (4) Low-skilled |
| Impact of slowdown and freeze | 0.020** (0.009) | 0.016 (0.013) | 0.025** (0.013) | 0.018 (0.015) |
| Observations | 53,540 | 26,235 | 27,305 | 21,268 |

Note: Reported coefficients are marginal effects. Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

*Impact of the freeze*
**The following results focus on the standalone impact of the freeze on employment prospects for young people.** We begin with examining the impact after the **implementation** of the freeze in October 2012, before considering possible employment effects that may have occurred when the freeze was **announced** in March 2012.

**Impact of the implementation of the freeze**
Table 7 and Table 8 show the marginal employment effects for individuals eligible for the 16-17 Year Old Rate and the Youth Development Rate (respectively) when the freeze was introduced in October 2012. When the freeze in the youth rates came into force, comparing 16 to 20 year olds with 21 and 22 year olds, **the results are statistically insignificant**.

| Table 7: | Impact of the implementation of the freeze on those eligible for the 16-17 Year Old Rate | | | |
|---|---|---|---|---|
| **Treatment group 16-17 year olds; control group 21-22 year olds** | | | | |
| | (1) All | (2) Men | (3) Women | (4) Low-skilled |
| Impact of implementation | -0.008 (0.011) | -0.013 (0.016) | -0.002 (0.017) | 0.006 (0.015) |
| Observations | 25,523 | 12,694 | 12,829 | 13,992 |

Note: Reported coefficients are marginal effects. Standard errors in parentheses; $^* p < 0.1$, $^{**} p < 0.05$, $^{***} p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

| Table 8: | Impact of the implementation of the freeze on those eligible for the Youth Development Rate | | | |
|---|---|---|---|---|
| **Treatment group 18-20 year olds; control group 21-22 year olds** | | | | |
| | (1) All | (2) Men | (3) Women | (4) Low-skilled |
| Impact of implementation | -0.009 (0.009) | -0.006 (0.013) | -0.011 (0.013) | 0.025 (0.016) |
| Observations | 38,836 | 18,936 | 19,900 | 15,082 |

Note: Reported coefficients are marginal effects. Standard errors in parentheses; $^* p < 0.1$, $^{**} p < 0.05$, $^{***} p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

**Impact of the announcement of the freeze**
Table 9 and Table 10 consider the effect on employment rates when the freeze in the two youth rates was **announced** for the first time in March 2012. Across the entire sample, there is no statistical evidence to suggest that the freeze had a detrimental impact on employment rates for individuals qualifying for the 16-17 Year Old Rate or the Youth Development Rate.

However, **there is evidence to suggest that employment rates for 'low-skilled' individuals improved upon the announcement of the freeze in March 2012**. In particular, individuals eligible for the 16-17 Year Old Rate (Youth Development Rate) experienced, on average, an **increase of 3.4 (3.8) percentage points in their employment rates** compared to individuals aged 21 and 22 when the freeze in the rates was announced. These effects are statistically significant at the 5% level.

| Table 9: Impact of the announcement of the freeze on those eligible for the 16-17 Year Old Rate | | | |
|---|---|---|---|
| Treatment group 16-17 year olds; control group 21-22 year olds | | | |
| | (1) All | (2) Men | (3) Women | (4) Low-skilled |
| Impact of announcement | 0.008 (0.013) | -0.006 (0.018) | 0.024 (0.019) | 0.034** (0.017) |
| Observations | 25,523 | 12,694 | 12,829 | 13,992 |

Note: Reported coefficients are marginal effects. Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

| Table 10: Impact of the announcement of the freeze on those eligible for the Youth Development Rate | | | |
|---|---|---|---|
| Treatment group 18-20 year olds; control group 21-22 year olds | | | |
| | (1) All | (2) Men | (3) Women | (4) Low-skilled |
| Impact of announcement | 0.005 (0.011) | 0.011 (0.015) | 0.001 (0.015) | 0.038** (0.018) |
| Observations | 38,836 | 18,936 | 19,900 | 15,082 |

Note: Reported coefficients are marginal effects. Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

The difference-in-differences analysis supports the findings from the descriptive analysis. The results suggest that the slower growth in the two youth rates since October 2011 has had a positive effect on the probability of employment for young people.

More specifically, there is statistical evidence (at the 5% significance level) to suggest that males aged between 16 and 17 and females aged between 18 and 20 experienced an increase of 5.4 and 2.5 percentage points in their employment prospects (respectively) when compared to 21 and 22 year olds over this period. In addition, 'low-skilled' individuals eligible for the 16-17 Year Old Rate experienced a positive employment effect.

**Focusing on the freeze alone, we find that the announcement of the freeze had a statistically significant impact on 'low-skilled' young people. In particular, they were 3.6-3.8 percentage points more likely to be employed compared to 21 and 22 year olds.**

## 3.3 What was the impact of the higher jump to the adult rate of the NMW?

### 3.3.1 Methodology

Based on the existing empirical literature, we use a regression discontinuity design (RDD) to test the impact of the decline in the Youth Development Rate as a proportion of the adult rate since October 2011. We focus on individuals who are 6 months either side of their 21$^{st}$ or 22$^{nd}$ birthday to ensure we have a sufficient sample size and do not pick up other factors that may influence labour market decisions. We define our discontinuity parameter as a dummy variable, which takes the value of one when individual $i$ has crossed the threshold age for the adult rate and zero otherwise. More formally, this can be represented as:

$$\text{dum}_i = \begin{cases} 1 \text{ if age}_i \geq \text{T} \\ 0 \text{ if age}_i < \text{T} \end{cases}, \text{ where age}_i \text{ is an individual's age measured in months and}$$

$$\text{T} = \begin{cases} 264 \text{ if } i \text{ is observed before October 2010} \\ 252 \text{ if } i \text{ is observed after October 2010} \end{cases}$$

Similar to previous studies, our base estimating equation has the following form:

$$y_i = f(\text{age}_i - \text{T}, \alpha) + f(\text{age}_i - \text{T}, \alpha^*) * \text{dum}_i + \beta\text{dum}_i + \gamma X_i + \varepsilon_i \,,$$

where $y_i$ is the dependent variable, $\text{dum}_i$ is the discontinuity dummy; $f(\text{age}_i - c, \alpha)$ is a second-order polynomial (quadratic) in $\text{age}_i$, where age is measured in discrete units after centring around the threshold age T; $X_i$ is a vector of additional covariates[10] and $\varepsilon_i$ is the error term. $\beta$ is the coefficient of interest, capturing the change in the dependent variable when individuals become eligible for the adult minimum wage rate.

A number of labour market outcomes are considered to examine the impact of this legislated wage increase. Our main focus in this report is on the probability of employment when individuals qualify for the adult rate. We also consider other binary outcome variables, including:

- whether or not the individual is unemployed; and
- whether or not the individual is inactive.

We also consider the following continuous outcome of interest:

- Number of hours worked per week.

For the binary dependent variables, the equations are estimated using a **probit** model. For the continuous variable, the equation is estimated as a **linear** regression model.

In order to determine whether any evidence of a discontinuity at the threshold age is a result of minimum wage policy, we perform a similar analysis one year below and one year above the threshold age. If there exists a discontinuity due to policy, we should expect to see no evidence of an impact during transitions at other ages. We also estimate a range of specifications to test the sensitivity of $\beta$, the discontinuity parameter, to the functional form of the polynomial, $f(\cdot)$. In particular, we consider linear, quadratic and cubic specifications and test these against a more general specification which allows for different employment rates at each discrete age from the threshold.

### 3.3.2 Data

The underlying data used to estimate the equation above is derived from the Special Licence Labour Force Survey (LFS) and covers the period from January 2003 to September 2013. The LFS is the official survey in the United Kingdom recording labour market outcomes in each quarter with around 100,000 respondents per quarter. At most, each respondent in the survey is tracked over five consecutive quarters. Our sample consists of 20, 21 and 22 year olds for whom we have approximately 4,000 observations in each quarter. To ensure we have a sufficient sample, we pool all observations together for the relevant periods of interest (i.e. low- and high-increase periods).

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[10] Additional covariates included gender, highest qualification obtained, whether the individual is enrolled in full time education, ethnicity, region of usual residence, month and year of interview.

Age (measured in months) is calculated by taking the difference between the month and year an individual was born and the month and year of their interview. The Special Licence LFS does not provide the day of an individual's birthday, therefore we estimate their age to the nearest month and are unable to provide a measure in days or weeks. Since our estimation covers periods with two different threshold ages, we measure distance from the threshold as the age in months from the relevant cut-off point. Before October 2010, the threshold age for the Adult minimum wage was 22 (or equivalently 264 months). Hence, for someone aged 267 months, their distance from the threshold age is recorded as +3 months, whereas someone aged 262 months is -2 months from the threshold age. After October 2010, the threshold age was lowered to 21, so observations were centred around 252 months using the same approach.

In the approach described above, individuals who are exactly equal to the threshold age in months (252 or 264) may be either side of the threshold; hence we use the age variable (in years) recorded by the LFS to split these observations. To ensure identification of these observations, we follow Dickens et al (2010) and assign value -0.25 to those below the threshold and +0.25 to those above, assuming they are midway between zero and half a month below or midway between zero and half a month above the threshold age, respectively.

Our main outcome of interest is whether an individual is employed or not. We use the LFS's measure of employment but exclude those who are self-employed or an unpaid family worker, since they are unlikely to be affected by the minimum wage rate. We also investigate the impact of qualifying for the adult rate by the level of qualification obtained by the individual. Using LFS variables, we define our measure of 'low' qualification, as individuals with highest qualification equivalent to GCSEs (with grades A*-C or equivalent), other, or no qualification.

### 3.3.3 Results

In this section, we present our results from the regression discontinuity analysis examining the impact of the freeze in the Youth Development Rate on labour market outcomes for individuals who become eligible for the adult rate. As mentioned, we focus on employment prospects as the main outcome of interest and explore these results in detail in the following subsection. We perform various validity checks in section 3.3.5. We discuss the impact on other labour market outcomes (unemployment, economic inactivity and hours worked) in section 3.3.6.  As an extension, we also analyse the impact of the recession on labour market outcomes at the threshold age. These results are presented in section 3.3.7.

### 3.3.4 Impact on employment outcomes

*All individuals*

Following common practice, we begin by considering our entire sample of individuals who are aged between T-6 months and T+6 months, where T is either 252 or 264 months depending on the interview month and year. We present marginal effects of the discontinuity parameter, β, which can be interpreted as the **change in employment probability for individuals who qualify for the adult rate** within six months of eligibility (i.e. up to six months above the threshold) **compared to those six months below the threshold age**.

Table 11 demonstrates the estimated marginal effects on employment for these individuals when they become eligible for the adult rate of the National Minimum Wage in the 'lower-jump' and 'higher-jump' period. A breakdown by gender is also provided.

| Table 11: Employment outcomes; All individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Lower-jump' period | | | 'Higher-jump' period | | |
| | (1)<br>All | (2)<br>Males | (3)<br>Females | (4)<br>All | (5)<br>Males | (6)<br>Females |
| Discontinuity | 0.016<br>(0.0184) | 0.008<br>(0.0183) | 0.024<br>(0.0274) | -0.068<br>(0.0436) | -0.065<br>(0.0404) | -0.073<br>(0.0606) |
| Observations | 22,418 | 10,786 | 11,632 | 8,349 | 4,027 | 4,322 |

Note: Reported coefficients are marginal effects. 'Lower-jump' period - October 2006 to September 2011 and 'Higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

In the 'lower-jump' period, although there is a positive but statistically insignificant discontinuity coefficient for both males and females, to interpret the findings, the analysis suggests that across all individuals, those young people within six months above the eligibility threshold are approximately 1.6 percentage points more likely to be employed compared to an individual less than six months below the threshold. On the other hand, in the 'higher-jump' period there is a negative impact on employment for men and women which is (also) statistically insignificant for both genders. Interestingly, considering the point estimates, the magnitude of the negative *impact* in the 'higher-jump' period is greater than the positive impact on employment prospects in the 'lower-jump' period. However, considering the statistical significance of the results, the analysis suggests that there is no evidence to indicate that there has been a change in employment outcomes when individuals cross the threshold age in either period.

However, following Dickens et al (2010), we restrict our sample to consider individuals with 'low' qualifications[11] (labelled as 'low-skilled' individuals), who are more likely to be affected by changes in the Adult minimum wage or threshold. Results are presented in Table 12 in the next subsection[12].

### Low-skilled individuals only

Understandably, the marginal effects of the discontinuity parameter are more striking when we consider low-skilled individuals only. In the 'lower-jump' period, there is a positive discontinuity coefficient for low-skilled men, which is significant at the 1% level of statistical significance. This suggests that, on average, low-skilled males experienced an increase of around 9.8 percentage points in their employment prospects upon reaching the adult minimum wage threshold in the 'lower-jump' period. This result is broadly in line with that achieved by Dickens et al (2010), despite different estimation periods. However, results vary slightly for females as the impact on employment is again positive but not statistically significant.

In the 'higher-jump' period, both low-skilled men and women have a large and statistically significant negative impact on their employment probability (at the 5% significance level). Specifically, for males the marginal effect is -0.12, which implies that for those individuals 6 months either side of the adult NMW threshold age, those individuals within 6 months above the

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[11] Defined by individuals with highest qualification equivalent to GCSEs, other or no qualification.
[12] Table 45 in the Annex provides the results for 'high-skilled' individuals. There is statistical evidence (at the 5% level) for 'high-skilled' males in the 'lower-jump' period. However, this effect disappears when we exclude observations within two weeks either side of the threshold age. Hence, we conclude the result is not robust.

threshold were 12 percentage points less likely to be employed than those individuals less than 6 months below the threshold.

| Table 12: Employment outcomes; Low-skilled individuals only | | | | | | |
|---|---|---|---|---|---|---|
| | 'Lower-jump' period | | | 'Higher-jump' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | 0.090*** (0.0296) | 0.098*** (0.0206) | 0.058 (0.0517) | -0.120*** (0.0355) | -0.120** (0.0473) | -0.134** (0.0558) |
| Observations | 9,039 | 4,459 | 4,580 | 2,945 | 1,530 | 1,415 |

Note: Reported coefficients are marginal effects. 'Lower-jump' period - October 2006 to September 2011 and 'Higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * p < 0.10, ** p < 0.05, *** p < 0.01
*Source: London Economics' analysis using the Labour Force Survey*

Hence, these results suggest that the freeze in the Youth Development Rate relative to the adult rate has had a detrimental impact on employment prospects for low-skilled individuals when they move onto the adult rate. However, to fully understand whether the impacts in the 'higher-jump' period are as a result of the relative freeze or other wider economic factors, we investigate the reliability and sensitivity of these results by examining the data in more detail. Before proceeding, it should be noted that sample sizes are relatively small in this period; therefore one must be cautious with the precision of these results.

*Robustness checks*

**Excluding observations in the birthday month**

We begin by graphically viewing our results to see if the discontinuity is observable in the data for low-skilled individuals. Figure 3, overleaf, shows the average employment rates at each discrete age point from the threshold age, alongside the predicted employment rate from the regression discontinuity analysis for all low-skilled individuals, and low-skilled males and females separately in the two different periods of estimation ('lower-jump' period in upper panel, and 'high increase' period in lower panel).

It is difficult to clearly identify any employment jump when the threshold is reached in the 'lower-jump' period, supporting the results in Table 12 above. Conversely, in the 'higher-jump' period, the data seems to be quite erratic at each discrete age point due to the relatively small sample sizes. Moreover, there are an even smaller number of observations within two weeks of an individuals' threshold age (21st birthday in the 'higher-jump' period). Hence, the data is even more erratic around the discontinuity, which may drive the sudden drop in employment rates observed in Figure 3. Therefore, we re-estimate the model excluding low-skilled individuals whose age in months from the threshold age is zero, i.e. those who are exactly 252 months (264 before the change in the threshold age). The results are presented in Table 5.

The estimates for the 'lower-jump' period remain relatively unchanged. However, in the 'higher-jump' period, for both low skilled men and women, there is still a negative effect on employment but this is no longer statistically significant. Results of similar estimations for all individuals are provided in Table 46 in Annex A1.1. Note that when considering the results of all individuals, and not just those designated as low skilled, the reported marginal effects change in direction and/or magnitude in the 'higher-jump' period. This highlights the **sensitivity** of the data in this period to

marginal changes in the composition of the dataset. However, we also observe changes in the 'lower-jump' period. The size of the marginal effects increase after removing observations around the threshold age for both males and females and become statistically significant at the 1% level for females. Therefore, despite the erratic nature of observations within two weeks of the threshold age in the 'higher-jump' period, it is not clear whether this group is driving the main results obtained above.

It could be argued that the legislated wage increase at the threshold age impacts individuals differently given their prior employment status. Specifically, we may expect individuals who are not employed before qualifying for the adult rate to increase their job search activities after crossing the threshold age given the higher wages on offer. Hence, results in Table 12 may show different effects, which may be insignificant if we condition on employment status in the previous period.

| Table 13: Employment outcomes excluding the birthday month; Low-skilled individuals only | | | | | | |
|---|---|---|---|---|---|---|
| | 'Lower-jump' period | | | 'Higher-jump' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | 0.126** (0.0498) | 0.106*** (0.0311) | 0.121 (0.0851) | -0.068* (0.0377) | -0.102 (0.0789) | -0.033 (0.0598) |
| Observations | 8,300 | 4,109 | 4,191 | 2,723 | 1,412 | 1,311 |

Note: Reported coefficients are marginal effects. 'Lower-jump' period - October 2006 to September 2011 and 'Higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

Before running econometric tests, Table 6 shows employment rates for individuals who do not cross the threshold age (above or below) and those who do cross the threshold age conditional on being employed in the previous quarter. In other words, for individuals crossing the threshold age, their previous observation was recorded before they crossed the threshold age. We use all observations in the sample to ensure we have sufficient sample sizes and use a 6-month window to restrict our sample as above.

**Figure 3: Employment rates by age in months for low-skilled individuals**
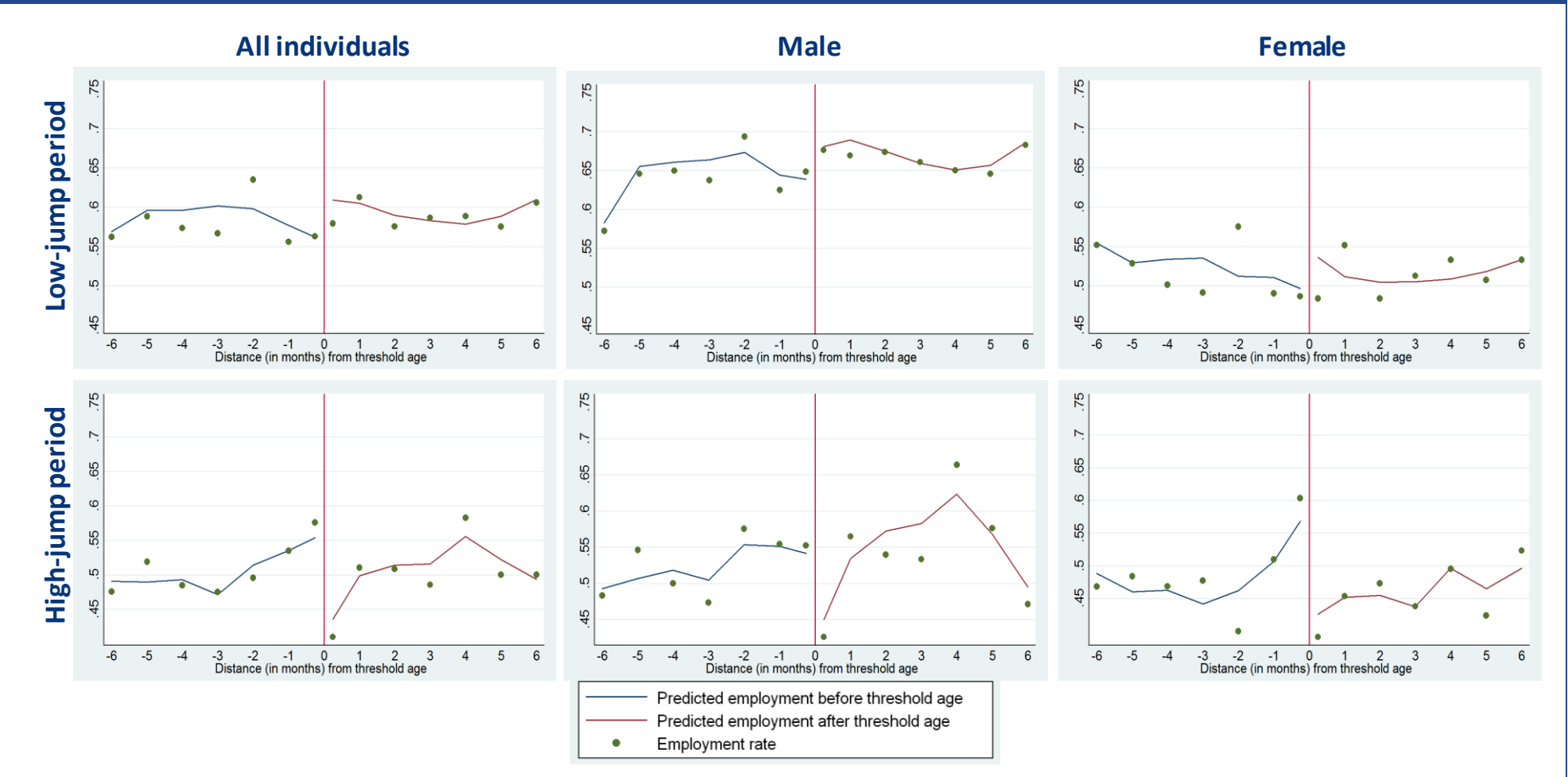


*Source: London Economics' analysis using the Labour Force Survey*

| Table 14: Employment rates conditional on employment in the previous quarter | | |
|---|---|---|
| **Grouping** | **'Low-increase' period** | **'High-increase' period** |
| All individuals not crossing the threshold age | 95.12% | 94.98% |
| All individuals crossing the threshold age | 94.96% | 94.86% |
| Males not crossing the threshold age | 95.21% | 95.24% |
| Males crossing the threshold age | 94.24% | 93.58% |
| Females not crossing the threshold age | 95.03% | 94.73% |
| Females crossing the threshold age | 95.67% | 96.27% |

Note: Sample includes all individuals regardless of qualification.
*Source: London Economics' analysis using the Labour Force Survey*

Overall, the differences across periods and whether the individual crosses the threshold age or not are very small. For those individuals crossing the threshold in the 'lower-jump' period, we see that conditional employment rates decline to a greater extent than for those individuals not crossing the threshold (although the effect is driven by a deterioration in employment outcomes for men). A similar outcome is experienced in the 'higher-jump' period; however, the relative effect of crossing the threshold on men (negative) and women (positive) is more apparent. Specifically, in the 'higher-jump' period, the analysis indicates that males crossing the threshold are 1.66 percentage points less likely to be in employment compared to a male not crossing the threshold, while females crossing the threshold are 1.44 percentage points more likely to be employed relative to a female not crossing the threshold.

Next, we test whether these changes are statistically significant. In order to do this, we re-define our dummy variable as equal to 1 if the individual has just crossed the age threshold, and zero for all other quarters. This ensures we identify the effect of crossing the threshold age on flows into and out of employment.

Results in Table 7 show the estimated probability of remaining in employment, conditional on being employed in the previous period. As with other studies, and supporting the descriptive analysis in Table 6, we find a **small negative impact** of becoming eligible for the adult rate, which is insignificant for both males and females, However, in the 'higher-jump' period, we find a **positive and statistically significant** (at the 1% level) for females and a **statistically insignificant negative impact** for males. This suggests that females who were employed at the age of 20 were 2.5 percentage points more likely to employed after reaching the threshold age of 21 compared to individuals who do not experience a change in age.

This result for females in the 'higher-jump' period is at odds with previous estimates given the negative employment effects reported in the main estimation (see Table 12 and Table 5). However, in the model specifications that control for employment status, we narrow the available sample size, which decreases the precision of the results obtained.

### Tracking individuals

To date, our analysis has pooled all available data to estimate the impact of the freeze in the Youth Development Rate on employment outcomes for young people. However, results may vary if we track the **same individuals** before and after the threshold age. In Table 16 below, we present the average employment rates for the same group of individuals one quarter before and one quarter after they become eligible for the adult rate of the National Minimum Wage.

| Table 15: Employment outcomes conditional on employment in previous period; All individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Lower-jump' period | | | 'Higher-jump' period | | |
| | (1)<br>**All** | (2)<br>**Males** | (1)<br>**All** | (2)<br>**Males** | (1)<br>**All** | (2)<br>**Males** |
| Discontinuity | -0.006<br>(0.00785) | -0.008<br>(0.0105) | -0.0005<br>(0.00864) | -0.014<br>(0.0120) | -0.023<br>(0.0166) | 0.025***<br>(0.00716) |
| Observations | 8,703 | 4,016 | 4,057 | 2,340 | 1,126 | 988 |

Note: Reported coefficients are marginal effects. 'Lower-jump' period - October 2006 to September 2011 and 'Higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

Interestingly, there is only one occasion when the employment rate falls for the same group of individuals when they qualify for the adult rate. This is the case for all males in the 'higher-jump' period. However, if we focus on low-skilled individuals, there is an increase in the employment rate of 1.6 and 1.2 percentage points in the 'lower-jump' and 'higher-jump' periods, respectively.

Therefore, when we track the same set of individuals, we get results that **do not support the findings in the 'higher-jump' period from the regression discontinuity approach**. **This implies that these results may be an artefact of the data and not driven by policy**. Moreover, given the relatively small samples, it is difficult to draw firm conclusions about the impact of the freeze in the Youth Development Rate on labour market outcomes for young people.

| Table 16: Average employment rates for the same group of individuals one quarter before and after the threshold age. | | | | | |
|---|---|---|---|---|---|
| **Group** | **Period** | **Employment rate before threshold age** | **Employment rate after threshold age** | **Difference (pp)** | **Observations** |
| All individuals | Low | 60.6% | 61.9% | +1.3 | 5,626 |
| Males | Low | 63.4% | 64.0% | +0.6 | 2,646 |
| Females | Low | 58.2% | 60.0% | +1.8 | 2,980 |
| All individuals | High | 57.9% | 58.2% | +0.3 | 2,280 |
| Males | High | 67.3% | 66.8% | -0.5 | 1,102 |
| Females | High | 49.1% | 50.1% | +1.0 | 1,178 |
| Low-skilled – All | Low | 52.3% | 53.9% | +1.6 | 1,762 |
| Low-skilled – Males | Low | 54.3% | 55.7% | +1.4 | 862 |
| Low-skilled - Females | Low | 50.4% | 52.2% | +1.8 | 900 |
| Low-skilled – All | High | 48.8% | 50.0% | +1.2 | 652 |
| Low-skilled – Males | High | 52.9% | 53.4% | +0.5 | 348 |
| Low-skilled - Females | High | 44.1% | 46.1% | +2.0 | 304 |

Note: This analysis only includes individuals who have observations in each period before and after the threshold age. It excludes individuals who are not 'low-skilled' in both periods.
*Source: London Economics' analysis using the Labour Force Survey*

In the next section, we carry out further robustness checks to test the reliability of our main findings.

### 3.3.5   Validity of results

***Falsification tests***

To understand the robustness of the data further, we implemented falsification tests to test for changes in employment outcomes at different age thresholds. If there is a discontinuity in employment at the threshold age due to the minimum wage policy, we should expect to find **no statistical evidence** of an employment effect at other ages. Hence, to determine if the results obtained for low-skilled individuals within 6 months of the threshold age are spurious or not, we re-estimate the model between 18 months and 6 months below threshold ('before' reaching the threshold), and between 6 months and 18 months above the threshold ('after' reaching the threshold).

| Table 17:  Falsification test - Employment outcomes (One year before); Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Lower-jump' period | | | 'Higher-jump' period | | |
| | (1)<br>All | (2)<br>Males | (3)<br>Females | (4)<br>All | (5)<br>Males | (6)<br>Females |
| Discontinuity | -0.012<br>(0.0154) | -0.013<br>(0.0272) | -0.011<br>(0.0298) | 0.004<br>(0.0288) | 0.024<br>(0.0533) | -0.036<br>(0.0537) |
| Observations | 9,252 | 4,722 | 4,530 | 3,037 | 1,511 | 1,526 |

Note: Reported coefficients are marginal effects. 'Lower-jump' period - October 2006 to September 2011 and 'Higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

The results are reassuring for observations 6 months either side of the point one year before the threshold age (Table 17), as there is no statistical evidence of a discontinuity at the age of 20 (2010Q4 and later) or 21 (2006Q1 to 2010Q3)[13].

Table 18 presents estimated marginal effects based on a discontinuity one-year after the actual threshold age. In the 'lower-jump' period, there is no evidence of a change in employment when individuals turned 21 or 22. On the other hand, in the 'higher-jump' period, the analysis shows that there is a significant employment change one year above the threshold age. Specifically, on moving between ages 21½ and 22½, the results indicate that there is (unexpected) evidence of a positive discontinuity for low-skilled males aged 22. This result seems to be driven by the relatively small sample in the 'higher-jump' period.

However, again we must be careful with the precision and stability of these results given the use of small sample sizes in this period. If we repeat this estimation excluding observations two weeks either side of the threshold, results change markedly with an even more pronounced positive employment effect for males and a negative employment effect on females. These results are provided in Table 47 in Annex A1.1. As more data becomes available, a larger sample size should improve the precision and stability of these estimates.

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[13] This differs from the results found by | Fidrmuc and Tena (2013) who find that young males face a lower probability of employment one year before the threshold age as employers anticipate that they will have to pay the adult rate.

| Table 18: Falsification test - Employment outcomes (One year after); Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Lower-jump' period | | | 'Higher-jump' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | 0.000 (0.0317) | 0.031 (0.0338) | -0.020 (0.0272) | 0.077*** (0.0220) | 0.147*** (0.0463) | -0.001 (0.0512) |
| Observations | 8,804 | 4,139 | 4,665 | 2,860 | 1,417 | 1,443 |

Note: Reported coefficients are marginal effects. 'Lower-jump' period - October 2006 to September 2011 and 'Higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

The results of the falsification tests suggest that the results in the 'higher-jump' period may be driven by potential inconsistencies in the data, rather than as a result of any change in the relative value of the Youth Development Rate and adult rate per se.

*Further specification checks*

**Widening the window below and above the threshold**

To date, our analysis has focused on data which is **six months** either side of the threshold age. As a specification check, we experiment by changing the length of the window either side of the threshold age. Table 19 shows the estimated marginal effects on employment for low-skilled individuals taking a **15 month window** (similar to Fidrmuc and Tena (2013)) either side of the threshold age.

| Table 19: Employment outcomes (15-month window); Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Lower-jump' period | | | 'Higher-jump' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | 0.023 (0.0322) | 0.022 (0.0248) | 0.013 (0.0479) | -0.050 (0.0309) | -0.035 (0.0344) | -0.065 (0.0495) |
| Observations | 21,622 | 10,591 | 11,031 | 7,010 | 3,570 | 3,440 |

Note: Reported coefficients are marginal effects. 'lower-jump' period - October 2006 to September 2011 and 'higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

As with the results using a six month window, the sign of the marginal effects are similar – positive in the 'lower-jump' period and negative in the 'higher-jump' period for both males and females. However, results are no longer statistically significant at normal levels of confidence. However, it can be argued that labour market opportunities faced by individuals in a 15 month window either side of the threshold are likely to vary to a greater extent and not really reflect the true nature of the impact of the uplift between the Youth Development Rate and adult rate for employers; hence the true discontinuity is better estimated using a shorter window of six months.

**Model specification – Order of polynomial**

The choice of the order of the polynomial in age, $f(\cdot)$, is crucial to ensure estimates are robust under the regression discontinuity approach. To see how well a different model specification fits the data, we also estimated the model using a cubic specification (rather than a quadratic). Results are shown in Table 20 below. The size and significance of the coefficients remain similar to those obtained using the original quadratic specification.

| Table 20: Employment outcomes (Cubic specification); Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Lower-jump' period | | | 'Higher-jump' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | 0.072** (0.0291) | 0.078*** (0.0190) | 0.047 (0.0520) | -0.097*** (0.0355) | -0.094** (0.0437) | -0.107* (0.0554) |
| Observations | 9,039 | 4,459 | 4,580 | 2,945 | 1,530 | 1,415 |

Note: Reported coefficients are marginal effects. 'Lower-jump' period - October 2006 to September 2011 and 'Higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

**Model of best-fit**

In order to identify the 'best-fit' model, we use the F-test approach provided in the guide for regression discontinuity design by Lee and Lemieux (2010). We begin by estimating the basic model for all low-skilled individuals with a simple linear specification in age, alongside an unrestricted model containing the same variables plus dummy variables that allow for different employment rates at each discrete age from the threshold. Using the $R^2$ values from both these estimations, we calculate the F-statistic and compare it to the relevant critical value from the F-distribution. If we are able to reject the null hypothesis that the two models are the same, we repeat the test but add higher-order terms to the polynomial in age and test against the unrestricted model. We continue the test until the F-statistic obtained is no longer statistically significant. Table 21 presents the F-statistics obtained using a linear, quadratic and cubic specification for models in the low- and high-increase periods.

We are able to reject the simple linear model in the 'lower-jump' period (at the 5% level), which suggests that the linear specification in age is over-smoothing the data. The F-statistic relating to the quadratic specification is not statistically significant implying that it can serve as an appropriate functional form for the regression discontinuity approach. Therefore, we proceed with a quadratic specification as the preferred model.

| Table 21: Specification check – F-test approach | | | | | |
|---|---|---|---|---|---|
| Period | Observations | Critical value (5% level) | F-statistic | | |
| | | | Linear | Quadratic | Cubic |
| 'lower-jump' | 9,039 | 1.69 | 1.71 | 1.00 | 1.28 |
| 'higher-jump' | 2,945 | | 0.44 | 0.28 | 0.30 |

*Source: London Economics' analysis using the Labour Force Survey*

In this section, we investigated the robustness of our results to the functional form of the basic estimating equation. In general, we obtained results that are in line with the existing evidence

base. In the next section, we examine the impact of the freeze in the Youth Development Rate relative to the adult rate of the National Minimum Wage on other labour market outcomes; namely, unemployment, economic inactivity and the number of hours worked.

### 3.3.6   Impact on other labour market outcomes

*Unemployment and economic inactivity*

With evidence of changes in employment as individuals approach the threshold age in both the lower- and higher-jump periods, there are likely to be changes in the other labour market outcomes – unemployment and economic inactivity.

Table 22 shows the estimated marginal effects on unemployment for low-skilled individuals when they become eligible for the adult NMW in both periods, alongside a breakdown by gender. In the 'lower-jump' period, there is statistical evidence (at the 5% level) demonstrating a reduction in unemployment for low-skilled males. The marginal effect implies that, on average, individuals eligible for the adult rate were 6.4 percentage points less likely to be unemployed than individuals not eligible for the adult rate. For low-skilled females in this period, the unemployment impact is statistically insignificant and close to zero. In contrast, in the 'higher-jump' period, there is strong evidence suggesting a rise in unemployment on crossing the threshold age for both low-skilled men and women.

| Table 22: Unemployment outcomes; Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Lower-jump' period | | | 'Higher-jump' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | -0.028* (0.0150) | -0.064** (0.0276) | -0.001 (0.00860) | 0.130*** (0.0351) | 0.162*** (0.0412) | 0.111*** (0.0309) |
| Observations | 9,351 | 4,716 | 4,635 | 3,035 | 1,595 | 1,440 |

Note: Reported coefficients are marginal effects. 'lower-jump' period - October 2006 to September 2011 and 'higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

On the other hand the impact on economic inactivity is negligible with no reported marginal effect being statistically significant for either males or females in both periods. The results are shown in Table 23 with economic inactivity as the dependent variable.

Hence, the rise in employment for low-skilled males in the 'lower-jump' period appears to be as a result of a reduction in unemployment as the unemployment rate falls by 6.4 percentage points for this group and is statistically significant. In the 'higher-jump' period, the fall in employment may be explained by a rise in unemployment for both males and females. However, as shown above, this result seems to be driven by the data as opposed to changes in minimum wage policy.

| Table 23: Economic inactivity; Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Lower-jump' period | | | 'Higher-jump' period | | |
| | (1)<br>All | (2)<br>Males | (3)<br>Females | (4)<br>All | (5)<br>Males | (6)<br>Females |
| Discontinuity | -0.034<br>(0.0266) | 0.002<br>(0.0144) | -0.042<br>(0.0541) | 0.001<br>(0.0147) | 0.002<br>(0.0143) | 0.005<br>(0.0373) |
| Observations | 9,351 | 4,176 | 4,635 | 3,035 | 1,525 | 1,440 |

Note: Reported coefficients are marginal effects. 'lower-jump' period - October 2006 to September 2011 and 'higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

### *Hours worked*

We determine the impact of the freeze in the Youth Development Rate relative to the adult rate of the NMW on the hours worked by young people using a linear regression model. Our measure of hours worked is equal to the hours worked per week including overtime and any hours worked on a second job.

The results in Table 24 show that, in the 'lower-jump' period, there is a negative coefficient for the number of hours worked by low-skilled for both males and females. On average, young males eligible for the adult rate were likely to work approximately one hour less per week than young males within six months below the threshold age. For females with similar qualifications, there is a negative impact on hours worked of approximately two hours per week. Similarly, in the 'higher-jump' period, low-skilled males and females experience a reduction in hours worked. However, there is no statistically significant impact on hours worked for both groups in both periods.

| Table 24: Hours worked; Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Lower-jump' period | | | 'Higher-jump' period | | |
| | (1)<br>All | (2)<br>Males | (3)<br>Females | (4)<br>All | (5)<br>Males | (6)<br>Females |
| Discontinuity | -1.148<br>(1.445) | -1.071<br>(1.612) | -2.087<br>(1.301) | 0.192<br>(1.819) | -1.037<br>(2.269) | -1.454<br>(3.139) |
| Observations | 5,193 | 2,852 | 2,341 | 1,450 | 801 | 649 |

Note: Reported coefficients are marginal effects. 'Lower-jump' period - October 2006 to September 2011 and 'Higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

Therefore, changes in employment seem to be explained by changes in unemployment for low-skilled individuals in both the 'lower-jump' and 'higher-jump' period. In addition, there is no statistical evidence of an impact on the number of hours worked per week.

In the next section, we repeat the above analysis to estimate the impact of the **recession** on labour market outcomes for young people.

### 3.3.7 Recession analysis

In this concluding section, we examine whether it is possible to disentangle the impact of the minimum wage increase at the threshold age from the more general poor labour market options available to young people since the 2008 recession. To do this, we divide the data into the following two periods:

(i) *'Pre-recession'* period - January 2003 to March 2008[14]
(i) *'Recession'* period - April 2008 to September 2013

As above, we restrict our sample to consider low-skilled individuals only, who are more likely to be exposed to low pay, and hence, the National Minimum Wage rates. Table 25 shows the marginal effects from the resulting estimations. In the 'pre-recession' period, we find that on average, low-skilled women were seven percentage points more likely to be employed when they became eligible for the adult rate, when compared to a similar group who were six months below the entitlement age. This positive impact is also statistically significant at the 5% level. The impact on low-skilled men is smaller and statistically insignificant. In contrast, in the 'recession' period, we identify a negative impact on the probability of being employed for low-skilled females, although the results are not statistically significant.

| Table 25: Recession analysis - Employment outcomes; Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | **'Pre-recession' period** | | | **'Recession' period** | | |
| | **(1)** **All** | **(2)** **Males** | **(3)** **Females** | **(4)** **All** | **(5)** **Males** | **(6)** **Females** |
| Discontinuity | 0.059*** (0.0180) | 0.038 (0.0273) | 0.070** (0.0278) | 0.017 (0.0510) | 0.034 (0.0260) | -0.010 (0.0775) |
| Observations | 9,999 | 4,659 | 5,340 | 8,789 | 4,474 | 4,315 |

Note: Reported coefficients are marginal effects. . 'Pre-recession' period - January 2003 to March 2008 and 'Recession' period - April 2008 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

To determine if these results for low-skilled individuals within six months of the threshold age are spurious or not, we carry out similar falsification tests as presented above. Table 48 in Annex A1.1 shows the results when we consider individuals a year before the threshold age (i.e. between 18 months and 6 months below threshold age), and in Table 49, we present the results for individuals between 6 and 18 months above the threshold age. Results for the 'pre-recession' period support the main findings as there is no evidence of a discontinuity in employment outcomes (for those individuals not affected by changes in minimum wage policy). However, results in the 'recession' period are mixed as we find statistical evidence of a discontinuity in employment outcomes for low-skilled males one year above **and** one year below the threshold age. This supports the findings of Fidrmuc and Tena (2013), who find that individuals have a lower probability of being employed one year before reaching the threshold age. The statistical significance of these results disappears when we re-run the estimation excluding observations within two weeks either side of the threshold age (see Table 50 and Table 51 in Annex A1.1).

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[14] ONS statistics show that the UK economy was officially in a recession from the second quarter in 2008, after two consecutive periods of negative growth.

In terms of other labour market outcomes, the rise in employment appears to be a result of falling levels of economic inactivity for all low-skilled individuals in the 'pre-recession' period. Specifically, the inactivity rate declines by 3.5 percentage points in this period for low-skilled workers and this is statistically significant at the 5% level. On the other hand, there is no effect on economic inactivity levels in the 'recession' period. **There is no significant impact on unemployment when low-skilled workers become eligible for the adult rate in either period** (with the results presented in Table 52 and Table 53 in Annex A1.1). There is some evidence (at the 5% level) that suggests that there was a decrease in the number of hours worked per week in the 'pre-recession' period for low-skilled women. In particular, young females were estimated to work 2.6 fewer hours per week when they crossed the threshold age compared to young females below the entitlement age.

**Section summary - the impact of minimum wage policy before and following the recession onset**

Having investigated the impact of recession in 2008 on labour market outcomes for low-skilled individuals who qualify for the adult national minimum wage rate, we find that individuals who qualified for the adult NMW experienced an increase in their employment probability in the 'pre-recession' period. This was particularly the case for low-skilled women and was driven to some extent by declining levels of economic inactivity. Our results were robust to standard falsification tests in the 'pre-recession' period; however, results in the 'recession' period were robust when we removed observations two weeks either side of the threshold age. **Overall, the results do not identify any significant impact of the uplift in the minimum wage between the Youth Development Rate and adult rate on labour market outcomes for young people following the onset of the economic downturn in 2008**.

## 3.4 Conclusions

### Did the freeze in the minimum wages for young people influence employment rates for those eligible?

Across all individuals eligible for the Youth Development Rate, compared to a decline in employment between 2007-08 and 2011-12 from **56%** to **45%**, the slow-down and subsequent freeze in the Youth Development Rate appears to have stabilised the average employment rate for qualifying  individuals - remaining fairly stable around **45%** since the freeze. Similarly, across all individuals eligible for 16-17 Year Old Rate, compared to a decline in employment between 2007-08 and 2011-12 from **32%** to **22%**, the slow-down and subsequent freeze in the 16-17 Year Old Rate appears to have also stabilised the average employment rate for qualifying individuals - standing at approximately **21%** since the freeze.

Tracking the same individuals eligible for a particular young persons' rate over time, the employment rate before and after the October uprating have generally increased for individuals eligible for the 16-17 Year Old Rate. In contrast, from the onset of the recession (2008 to 2010), the average employment rates for individuals qualifying for the Youth Development Rate have declined following the October uprating. However, since the slower growth in the Youth Development Rate relative to the adult rate of the National Minimum Wage in October 2011, and subsequent freeze in the in the Youth Development Rate in October 2012, employment rates have *risen*, thereby restoring the historic patterns of increasing employment.

Furthermore, undertaking a **difference-in-differences** analysis, the relative employment of young people (aged 16-20) was assessed (compared to individuals aged 21 or 22). The analysis was

undertaken for a range of time periods around the time of the announcement or implementation of the freeze in the relevant minimum wages, but also covering the period of relative slowdown *and* subsequent freeze in the minimum wage.

- The results suggest that there is strong and statistically significant evidence of a positive impact on employment rates for young people. More specifically, individuals aged between 16 and 20 were **2.5 percentage points more likely to be employed** compared to individuals aged 21 and 22 as a result of the slowdown and freeze in the two youth rates. A similar positive impact is achieved when the estimation is carried out by gender and for 'low-skilled' individuals (those with highest qualification at or below 5 or more GCSEs at grades A*-C).

- In addition, **there is evidence to suggest that employment rates for 'low-skilled' individuals improved upon the announcement of the freeze in March 2012**. In particular, individuals eligible for the 16-17 Year Old Rate (Youth Development Rate) experienced, on average, an **increase of 3.4 (3.8) percentage points in their employment rates** compared to individuals aged 21 and 22 when the freeze in the rates was announced.

## Did the freeze in the Youth Development Rate have an effect on labour market outcomes for individuals becoming eligible for the adult rate?

In this section, we used regression discontinuity design to examine the impact of national minimum wage policy on labour market outcomes for young people. Specifically, we investigate the effect of the freeze in the Youth Development Rate (for 18 to 20/21 year olds) relative to the adult rate of the NMW (21 or 22 year olds and above) on employment outcomes for individuals who are six months either side of the threshold age. We do this by dividing the LFS data into two periods, namely:

(iii) *'Lower-jump'* period October 2006 to September 2011 - increase in the minimum wage on becoming eligible for the adult rate was steady at around 20% and;

(iv) *'Higher-jump'* period October 2011 to September 2013 – increase in the minimum wage was considerably higher.

We find that **there is no detrimental labour market impact of becoming eligible for the adult rate during the recessionary period.**

At an aggregate level, our results suggest that there is no statistical evidence of an impact on employment prospects across all individuals irrespective of their qualification level. However, when we restrict our sample to consider 'low-skilled' individuals only (defined by individuals with highest qualification equivalent to GCSEs, other or no qualification), the results are more striking.

- In the 'lower-jump' period, our results are **consistent** with previous studies which suggest that there is a positive impact on employment outcomes when low-skilled workers become entitled to the adult rate. In particular, we find a positive and significant impact for young men, equivalent to an increase of around 9.8 percentage points in their employment prospects when they qualify for the adult rate compared to individuals who were six months below the threshold age. We also find a positive impact for young women in this period, but it is statistically insignificant.

- The results in the 'higher-jump' period contrast those seen in the 'lower-jump' period, with the model identifying a strongly significant negative impact on employment

outcomes for both men and women. This initial analysis would suggest that the freeze in the Youth Development Rate has had a detrimental impact on the employment prospects for low-skilled workers when they become eligible for the adult rate of the NMW. However, after a closer examination of the data and robustness checks, **the results are not particularly robust and may be an artefact of the data**. Moreover, given the relatively small samples in this period, we believe the true impact will only become clear as more data becomes available.

■ Additionally, we find that in both periods, the changes in employment appear to be a result of changes in the level of unemployment and that there is no evidence of an impact at the threshold age on hours worked by young people.

As a true extension to previous studies, we also attempt to disentangle the impact of the recession on labour market outcomes for individuals from the potential labour market outcomes associated with becoming eligible for the adult NMW. Using a similar approach to the above analysis, we find that **there is no detrimental labour market impact of becoming eligible for the adult rate during the recessionary period**, whereas there was a positive labour market impact of becoming eligible for the adult rate in the pre-recession period.

# 4 Impact of reducing the age of entitlement for the adult rate to 21 (RO4)

## 4.1 Background and context

In October 2010, the age of entitlement to the adult minimum wage was reduced from 22 to 21. Therefore, 21 year olds saw a 21% increase in their minimum wage in October 2010, an increase that was not seen for other similar age groups.

This change in the threshold age for the adult minimum wage provides a 'quasi-experimental' setting, since one group of people (21 year olds) were subject to an increase in the minimum wage whereas similar groups (20 and 22 year olds) were not. This policy change can be exploited using a **difference-in-differences** approach to estimate the impact of the increase in the minimum wage on the employment outcomes of young people.

The approach taken in this chapter builds on the work of Crawford et al. (2011), who also used a difference-in-differences approach to estimate the effects of the reduction of the age of entitlement for the adult rate on the employment outcomes of 21 year olds.

This chapter advances our knowledge of the impact of the reduction in the age of entitlement to the adult rate in two main ways.

■ Firstly, when Crawford et al. (2011) conducted their analysis, only data up to March 2011 was available, giving six months of data following the policy change; while the analysis presented here uses data up to September 2013, three years following the policy change, thereby allowing a fuller understanding of employment effects. The longer time period is particularly relevant given the wider empirical findings of Hyslop and Stillman (2011) that demonstrated that changes to the minimum wage regime in New Zealand had no significant immediate effect but did affect employment outcomes in the second and third years following the policy change.

■ Secondly, the analysis presented here also extends the analysis of Crawford et al. (2011) to consider the following:

■ how the impact on employment outcomes varies by gender and level of qualification of the individual; and

■ the potential impact on a range of labour market outcomes including the likelihood of being employed, unemployed and inactive, and on the number of hours worked for those in employment.

The remainder of the chapter is organised as follows. Section 4.2 outlines the methodological approach and discusses the reasonableness of assumptions made. Data sources and the definition of variables are discussed in section 4.3. Section 4.4 presents a descriptive analysis of labour market outcomes of young people over the period of analysis and presents tests of the common trends assumption. Section 4.5 presents the main econometric results, and section 4.7 concludes.

## 4.2    Methodology

Difference-in-differences estimation is used to identify the impact of the reduction in the age of entitlement to the adult rate from 22 to 21 on the employment outcomes of 21 year olds.

The identification approach involves a comparison of a **treatment group** (individuals aged 21 in each period) with a **control group** (individuals aged 20 or 22 in each period). The basic estimating equation is:

$$y_{it} = \alpha + \beta_1 * after_t + \beta_2 * treat_i + \beta_3 * treat_i * after_t + \boldsymbol{\gamma}\boldsymbol{x}_{it} + \varepsilon_{it}$$

where $y_{it}$ is the dependent variable; $after_t$ is a dummy variable that equals 1 if the observation is from the period after the reduction in the age of entitlement; $treat_i$ is a dummy variable that equals 1 if the individual is 21 years old; and $\boldsymbol{x}_{it}$ is a vector of covariates. In this analysis, $\beta_3$ is the parameter of interest. For binary outcome variables, the estimating equation is estimated using a probit model; while for continuous outcome variables, an OLS model specification is used.

A change in the minimum wage regime may affect employment outcomes at both the **extensive margin** – i.e. whether or not an individual is in employment – and the **intensive margin** – if an individual is employed, the number of hours they work. Therefore, the following labour market outcomes are considered:

• whether or not the individual is employed;

• whether or not the individual is unemployed;

■ whether or not the individual is inactive; and

■ number of hours worked per week.

For each outcome of interest, the estimating equation is run separately for the cohort as a whole, as well as for men, women and for low-skilled individuals separately, where being low-skilled is defined as having a highest level of qualification at GCSE level or equivalent or lower.

It is important to note that the effects estimated by the above model specification are the average effects of eligibility for the adult rate. Since many individuals, in particular those in high paying jobs, are unlikely to be affected by the minimum wage regime, the effect on individuals that are affected by the minimum wage regime may be significantly higher than that identified for the

cohort as a whole. Estimates of $\hat{\beta}_3$, therefore, can be interpreted as *intent-to-treat* estimates[15] of the effect of the increase in minimum wage on those affected by the minimum wage regime.

## 4.2.1 Assumptions

The approach outlined above identifies the average effect of the reduction in the threshold age on 21 year olds under two assumptions: firstly, that the control group is not affected by the policy change; and secondly, that without the policy change both the treatment and control group would have followed a common trend. The latter assumption is referred to as the ***common trends assumption***.

Whilst neither of these assumptions can be directly empirically tested, there are some checks that can be performed to examine whether they are reasonable to make. This section discusses whether these assumptions are reasonable to make.

### *The control groups are not affected by the policy change*

The main control groups used in this research are 20 year olds and 22 year olds since they are likely to be most similar to 21 year olds. However, would 20 and 22 year olds also have been affected by the policy change?

One reason that 20 and 22 year olds might have been affected is if, because the policy change made employing 21 year olds relatively expensive, employers might have substituted 20 or 22 year old workers for 21 year olds. This substitution effect would therefore improve the employment outcomes of 20 and 22 year olds.

It is important to note that, if there are such substitution effects, $\hat{\beta}_3$ would over-estimate the effect on employment outcomes of 21 year olds. Therefore, the presence of substitution effects would cause doubt about the magnitude (and potential significance) of effects estimated.

For each outcome of interest, falsification tests are performed using 20 and 22 year olds as the treatment groups alongside 19 and 23 year olds as the control groups respectively. Since any substitution effects can be expected to be strongest on the workers most similar to 21 year olds, these falsification tests can also be interpreted as a test for the presence of substitution effects. No evidence of significant substitution effects are found, although it should be noted that such effects are likely to be small, so these results should not be interpreted as evidence of the absence of substitution effects.

### *The common trends assumptions*

Is the common trends assumption likely to hold? The period of analysis was one of significant change in the labour market, with young people's employment outcomes adversely affected by the recession starting in April 2008, which had both immediate and lagged impacts on employment prospects lasting throughout the period. Whilst all young people were adversely affected by the recession, it is possible that it affected age groups asymmetrically, in particular since those with the least experience may have suffered most.

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[15] See Duflo, Glennerster and Kremer (2007) for definition of intent-to-treat estimation

The common trends assumption is tested empirically as far as possible in section 4.4.1. The results of the tests provide some support for the common trends assumption, although they suggest that 20 year olds may be a better control group than 22 year olds since there is some evidence that 22 year olds are affected differently to 21 year olds by common shocks.

Throughout the analysis, results are presented using both 20 year olds and 22 year olds as the control group. Since the common trends assumption cannot be fully tested throughout the period of analysis, it is argued that less confidence should be placed in results that are significant compared to one control group only, but if significant results are found compared to both control groups, this is seen to be more persuasive evidence of effects of the policy change.

## 4.3    Data

The data used in this analysis is taken from the Special License Labour Force Survey (LFS) and covers the period from January 2003 to September 2013. However, due to the concerns about the common trends assumption discussed in section 4.4.1, the majority of the econometric analysis uses data from the start of the recession in April 2008 onwards only.

The binary employment outcome variables of interest – whether or not in employment, unemployment and inactivity – are derived from the variable *lfstat*. For the econometric analysis, the self-employed and unpaid family workers are omitted, since they would not be expected to be affected by the minimum wage regime. Those declaring themselves not in the labour force because they are engaged in study are also omitted. For the main estimating equations, individuals in full-time education that are also in employment or otherwise consider themselves in the labour market are included, although the results with those in full-time education omitted are also considered in Annex A1.2. The variable for hours worked is derived from the LFS variable *sumhrs*, which is a measure of actual hours worked in the reference week including both overtime and any hours worked in a second job.

The estimating equations in the econometric analysis include the following controls, all of which are available in the Labour Force Survey: a piecewise quadratic of age, defined in months from the relevant birthday (21st birthday when using 20 year olds as the control group; 22nd birthday when 22 year olds are the control group); gender; ethnicity; marital status, region of residence; level of qualification; and year and month dummies.

As previously mentioned, for the equations estimated for the low skilled, the definition of low skilled used is a highest level of qualification at GCSE level or lower.

## 4.4    Descriptive and preliminary analysis

Before turning to the econometric analysis, this section first provides a descriptive analysis of trends in labour market outcomes of young people, and secondly, performs tests of the common trends assumption paying particular attention to the effects of the recession.

Figure 4 presents graphically the evolution of each of the four outcome variables of interest for young people through the period. The two vertical lines in each graph indicate the beginning of the recession in April 2008 and the change in the Adult NMW threshold in October 2010. Data is grouped into years running from October to September since changes to the minimum wage regime occur on the 1st October each year.

The following points are notable.

- There was a large fall in employment rates and increase in unemployment rates for all age groups following the start of the 2008-09 recession.
- In the year immediately following 21 year olds becoming eligible for the adult rate (October 2010 to September 2011), it appears that 21 year olds' employment rate fell less than for 19 and 20 year olds.
- In the following year (October 2011 to September 2012), it looks as though 21 year olds fared badly relative to 19 and 20 year olds in terms of both employment and unemployment rates.
- There appears to have been little common effect of the recession on inactivity rates, although for all 21 year olds inactivity rates fell both following the recession and following the change in threshold age.
- The average number of hours worked fell for 21 year olds following the threshold change in contrast to all other groups other than 23 year olds, although the number of hours worked increased again the following year.

One point of importance for the present analysis is that the labour market changed considerably during and following the recession. Therefore, it may not make sense to compare employment outcomes following the recession with outcomes before. The next section considers formal tests of the common trends hypothesis.

### 4.4.1 The common trends assumption and the impact of the recession

Following Crawford et al. (2011), data from before the policy change is used with interaction effects between being in the treatment group and year dummies to test for a common trend. As shown in Table 26, none of these effects are significant at the 10% level indicating that this test does not reject the common trends assumption.

| Table 26: Testing the common trends assumption | | | | |
|---|---|---|---|---|
| Interaction between being aged 21 and year dummies | (1) 20 year olds as control group | | (2) 22 year olds as control group | |
| 2004 | 0.063 | (0.059) | 0.007 | (0.058) |
| 2005 | 0.012 | (0.062) | -0.027 | (0.059) |
| 2006 | 0.059 | (0.061) | 0.051 | (0.059) |
| 2007 | 0.081 | (0.060) | 0.063 | (0.058) |
| 2008 | 0.041 | (0.061) | -0.038 | (0.059) |
| 2009 | 0.039 | (0.060) | -0.035 | (0.058) |
| 2010 | 0.093 | (0.060) | -0.024 | (0.058) |
| N | 53,522 | | 56,392 | |

Note: Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
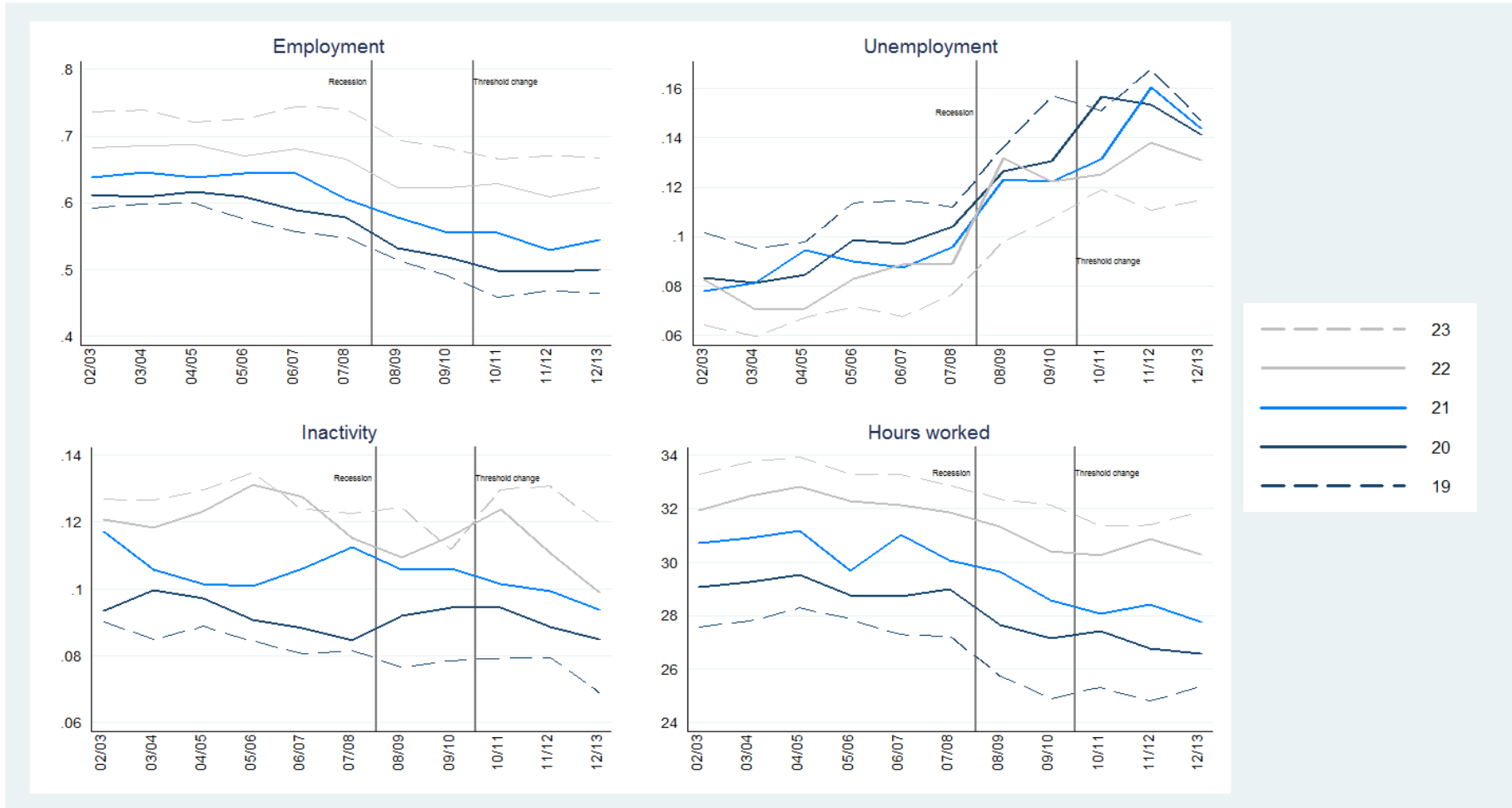*Source: London Economics' analysis using the Labour Force Survey (2003-2010 inclusive)*

As a further test of the common trends assumption, the impact of the recession on treatment (21 year olds) and control (20 or 22 year olds) groups is examined using the main estimating equation

described in section 4.2; however, with the 'before' period defined as from January 2001 to March 2008, and the 'after' period from April 2008 to September 2010 (that is, from the beginning of the recession to just before the policy change). This specification therefore tests whether treatment and control groups were affected by the recession in the same way.

Table 27 shows that there is no evidence that 21 year olds were affected differently by the recession to 20 year olds, but **there were significant differences** in the effects on 21 year olds and 22 year olds, with 21 year old women in particular suffering more from the recession than 22 year old women (represented by the coefficient -0.034).

The results in Table 27 have two main consequences for this research. Firstly, 20 year olds may be a better control group than 22 year olds for comparing trends in labour market outcomes with 21 year olds, since they appear to react to common shocks more similarly. Secondly, the evidence that 21 year olds and 22 year olds **did not** follow a common trend following the onset of the recession suggests that using an extended 'before' period (i.e. January 2003 to September 2010) would be comparing labour market outcomes from very dissimilar periods of economic growth. Therefore, the main estimating equations used in this analysis limit the 'before' period to the period following the start of the recession (i.e. April 2008 to September 2010).

**Figure 4:  Labour market outcomes of young people 2003 to 2013**



*Source: London Economics' analysis using the Labour Force Survey.* Note: Employment, unemployment and inactivity rates exclude self-employed and unpaid family workers.

| Table 27: The effect of the recession | | | | |
|---|---|---|---|---|
| **Treatment group 21 year olds; control group 20 year olds (all pre treatment)** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of the recession | 0.002 (0.009) | 0.002 (0.012) | 0.003 (0.012) | 0.016 (0.014) |
| *N* | 53,680 | 27,682 | 25,998 | 25,507 |
| **Treatment group 21 year olds; control group 22 year olds (all pre treatment)** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of the recession | -0.017** (0.008) | -0.034** (0.012) | 0.005 (0.012) | 0.007 (0.014) |
| *N* | 56,555 | 29,842 | 26,713 | 25,875 |

Note: Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey (2003-2010 inclusive)*

## 4.5    Results

This section first presents the main results of the econometric analysis of the effects of eligibility for the adult rate on the likelihood of being employed, including robustness and falsification tests. Secondly, the results of the analysis of the impact on the likelihood of being unemployed and inactive are presented, and finally, the impact on the number of hours worked. Falsification tests are not presented for the latter two analyses but are presented in full in Annex A1.1.

### 4.5.1    Impact on employment

Table 28 presents the results of estimating the equation in section 4.2 (the $\hat{\beta}_3$ difference-in-difference coefficients) specifying the 'before' period in three different ways: column (1) uses the extended 'before' period from January 2003 to September 2010; column (2) uses a shortened 'before' period starting between April 2008 and September 2010; and column (3) uses the long before period but also includes an **interaction effect** for being 'after the recession' thereby separately identifying the impact of the recession and the impact of the change in the entitlement age.

The analysis demonstrates that estimated impacts are **sensitive** to the specification of the 'before' period. Using 20 year olds as the control group, point estimates are similar in all three cases but only significant at the 10% level in column (1). In particular, the results suggest that 21 year olds were approximately 1.6 percentage points more likely to be employed upon reaching the adult threshold compared to 20 years olds. However, using 22 year olds as the control group, a negative but statistically insignificant effect in column (1) contrasts with much smaller point estimates in the other two specifications (suggesting that 21 year olds were 1.4 percentage points less likely to be employed when compared to 22 years olds). However, in the third specification (column 3), when we attempt to 'strip out' the impact of the recession on the employment outcomes of young people, the analysis indicates that the recession was almost entirely responsible for the decline in employment outcomes of 21 year olds compared to 22 years olds, while reaching the threshold age for the adult minimum wage had no impact on employment outcomes of the treatment group.

These results re-iterate the previous conclusion that too much change occurred in the labour market during the recession to place confidence in specifications using the extended 'before' period. As such, for the remainder of the econometric analysis in this chapter, the short 'before' period as in specification (2) is used to isolate the impact of the changing threshold on employment outcomes rather than the longer 'before' period which incorrectly attributes changing employment outcomes to the threshold instead of the economic recession and general deterioration of employment outcomes.

| Table 28: Estimated effects on employment with different before periods | | | |
|---|---|---|---|
| **Treatment group 21 year olds; control group 20 year olds** | | | |
| | (1) Before period Jan 2003 to Sept 2010 | (2) Before period April 2008 to Sept 2010 | (3) Before period Jan 2003 to Sept 2010 including an interaction effect for the impact of the recession |
| Impact of the entitlement to the adult rate | 0.016* (0.009) | 0.016 (0.012) | 0.015 (0.011) |
| Impact of the recession | | | 0.002 (0.009) |
| N | 67,560 | 31,120 | 67,560 |
| **Treatment group 21 year olds; control group 22 year olds** | | | |
| | (1) Before period Jan 2003 to Sept 2010 | (2) Before period April 2008 to Sept 2010 | (3) Before period Jan 2003 to Sept 2010 including an interaction effect for the impact of the recession |
| Impact of the entitlement to the adult rate | -0.014 (0.009) | -0.002 (0.011) | -0.003 (0.010) |
| Impact of the recession | | | -0.018** (0.009) |
| N | 71,476 | 33,153 | 71,476 |

Note: Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

Table 29 uses the preferred specification to examine whether the impact on employment varies by gender and for the low-skilled. Overall, there is little evidence of statistically significant effects, with a positive but insignificant effect on employment for the cohort as a whole when using 20 year olds as the control group and a negative but insignificant effect on employment for men and low-skilled individuals using 22 year olds as the control group.

Most interestingly, for women there is a **positive and sizeable effect** on the likelihood of being employed compared to both control groups, although this is only significant at the 10% level when using 20 year olds as the control group. The results suggest that entitlement to the adult rate increased the likelihood of the average female 21 year old being employed by 2.9 percentage

points and 1.6 percentage points respectively. The analysis also indicates that there was **no statistically significant effect** of reaching the threshold for those in possession of low skills.

| **Table 29: The effect of entitlement to the adult rate on employment** | | | | |
|---|---|---|---|---|
| **Treatment group 21 year olds; control group 20 year olds** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | 0.016 (0.012) | 0.029* (0.015) | 0.002 (0.017) | -0.002 (0.019) |
| *N* | 31,120 | 15,971 | 15,149 | 14,147 |
| **Treatment group 21 year olds; control group 22 year olds** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | -0.002 (0.011) | 0.016 (0.015) | -0.022 (0.016) | -0.027 (0.019) |
| *N* | 33,153 | 17,333 | 15,820 | 14,205 |

Note: Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

### *Robustness checks*

It is important to consider to what extent the above results are robust. As a result of the findings presented in Table 29, and in particular the positive impact of reaching the entitlement threshold on women, Table 30 presents further robustness checks using 20 year olds as the control group. Specifically, only individuals within 6 months of their 21st birthday are included (i.e. individuals aged between 21 and 21½ compared to individuals aged between 20½ and 21), since it may be that the main specification includes individuals that are too different to each other to provide a reliable control group.

| **Table 30: Robustness checks** | | | | |
|---|---|---|---|---|
| **Treatment group 21 year olds; control group 20 year olds; including only those within 6 months of their 21st birthday** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | -0.011 (0.014) | 0.023 (0.018) | -0.002 (0.019) | -0.010 (0.022) |
| N | 16,697 | 8,496 | 8,201 | 7,671 |

Note: Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

The results presented in Table 30 show that the results are sensitive to the exact specification used. In the first case, the estimate of the impact on the whole cohort changes signs, whilst the estimated impact on women is lower than in Table 29 and loses its significance. However, although there is a lack of statistical significance on the coefficient relating to women (as might be expected

given the halving of the sample available), there is still some evidence that the employment outcomes of women improved relative to the control group upon reaching the threshold age.

*Falsification tests*

Table 31 shows the results of falsification tests, which estimate the main specification with different treatment and control groups (i.e. 20 year olds compared to 19 year olds and 22 year olds compared to 23 year olds). No statistically significant results are found, therefore providing no evidence that there were different trends between age groups of young people over the period of analysis. The falsification tests can also be interpreted as providing **no evidence of spillover effects** of the change in threshold age on 20 or 22 year olds, which might have been expected if substitution effects had occurred.

| Table 31: Falsification tests | | | | |
|---|---|---|---|---|
| **Treatment group 20 year olds; control group 19 year olds** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | 0.001 (0.012) | -0.004 (0.015) | 0.006 (0.017) | 0.021 (0.019) |
| *N* | 30,776 | 15,585 | 15,191 | 14,542 |
| **Treatment group 22 year olds; control group 23 year olds** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | -0.005 (0.011) | 0.010 (0.014) | -0.016 (0.015) | -0.015 (0.019) |
| *N* | 35,195 | 18,645 | 16,550 | 14,489 |

Note: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

### 4.5.2  The impact on unemployment and inactivity

Table 32 and Table 33 present the estimated impacts on the likelihood of 21 year olds being unemployed and inactive respectively.

Using 22 year olds as the control group, the results in Table 32 suggest an economically large and strongly statistically significant increase in the likelihood of both men and the low-skilled being unemployed. Using 20 year olds as the control group, point estimates for these two groups are also positive, but statistically insignificant. However, the falsification tests shown in A1.2 find statistically different trends in unemployment between 22 and 23 year old men over the period, suggesting that there may have been different trends in unemployment for 21 and 22 year old men over this period without the policy change.

Meanwhile, the results in Table 33 show negative point estimates of the impact of eligibility for the adult rate on inactivity using both control groups for all cohorts. These results are strongly significant for the cohort as a whole and for men when using 22 year olds as the control group, but only weakly significant for the cohort as a whole when using 20 year olds as the control group. The

falsification tests in Table 59 show no significant effects, lending support to the result that eligibility for the adult rate reduced inactivity of 21 year olds.

The implication of these results is that becoming eligible for the adult rate of the National Minimum Wage resulted in a reduction in the level of economic inactivity (for men and amongst the low skilled), but the labour market transition was not into employment but rather into unemployment.

| **Table 32: The effect of entitlement to the adult rate on unemployment** | | | | |
|---|---|---|---|---|
| **Treatment group 21 year olds; control group 20 year olds** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | 0.001 (0.010) | -0.010 (0.012) | 0.014 (0.016) | 0.017 (0.016) |
| N | 31,120 | 15,971 | 15,149 | 14,147 |
| **Treatment group 21 year olds; control group 22 year olds** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | 0.021** (0.009) | -0.001 (0.011) | 0.047*** (0.015) | 0.037** (0.015) |
| N | 33,153 | 17,333 | 15,820 | 14,205 |

Note: Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey*

| **Table 33: The effect of entitlement to the adult rate on inactivity** | | | | |
|---|---|---|---|---|
| **Treatment group 21 year olds; control group 20 year olds** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | -0.016* (0.008) | -0.019 (0.012) | -0.014 (0.009) | -0.012 (0.015) |
| N | 31,120 | 15,971 | 15,149 | 14,147 |
| **Treatment group 21 year olds; control group 22 year olds** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | -0.022*** (0.008) | -0.019 (0.012) | -0.025*** (0.009) | -0.016 (0.016) |
| N | 33,153 | 17,333 | 15,820 | 14,205 |

Note: Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey.*

### 4.5.3   The impact on hours worked

Finally in this section, Table 34 presents the results of the estimated impact on hours worked. In all cases there are negative point estimates implying that becoming eligible for the adult minimum wage resulted in a reduction in the number of hours worked; however, none of these are statistically significant. The implication of this finding is that although there is no evidence of substitution between workers (of different ages), there does appear to be some trade off between the number of individuals employed and the number of hours worked so that the total salary bill remains relatively unchanged.

Interestingly, when those in full-time education are excluded, the point estimates become larger, and the estimated impact on the number of hours worked by men becomes statistically significant at the 10% level using both control groups (see Table 35). The point estimates in Table 35 imply that for the average man not in full-time education, eligibility for the adult rate reduced the number of hours worked by 1.21 and 1.17 hours respectively.

| Table 34: The effect of entitlement to the adult rate on hours worked for those in employment | | | | |
|---|---|---|---|---|
| **Treatment group 21 year olds; control group 20 year olds** | | | | |
| | (1)<br>All | (2)<br>Women | (3)<br>Men | (4)<br>Low-skilled |
| Impact of entitlement to the adult rate | -0.366<br>(0.480) | -0.728<br>(0.680) | -0.171<br>(0.674) | -0.771<br>(0.744) |
| *N* | 21,172 | 10,745 | 10,427 | 8,006 |
| **Treatment group 21 year olds; control group 22 year olds** | | | | |
| | (1)<br>All | (2)<br>Women | (3)<br>Men | (4)<br>Low-skilled |
| Impact of entitlement to the adult rate | -0.751<br>(0.467) | -0.682<br>(0.665) | -0.981<br>(0.649) | -0.524<br>(0.769) |
| *N* | 23,075 | 11,807 | 11,268 | 8,190 |

Note: Standard errors in parentheses; $^* p < 0.1$, $^{**} p < 0.05$, $^{***} p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey.*

## 4.6   Further robustness checks

*Testing the equality of coefficients before and after October 2010*

To assess whether young people turning 21 experienced a radical change in their labour market opportunities following the reduction of the age of entitlement to the adult NMW from 22 to 21 in October 2010, we undertook some further analysis testing the equality of coefficients before and after October 2010. To do this in practical terms, we interacted a variable identifying the "after" period (post-October 2010) with all the explanatory variables, including the treatment variable (i.e. being 21 or not). Thus, we allowed the explanatory variables to have different effects before and after October 2010 and then we tested whether differences across estimated coefficients were statistically significant, with a specific focus on the treatment variable. In other words, we tested whether October 2010 represented a significant break in the observed data for 21 year olds.

| Table 35: The effect of entitlement to the adult rate on hours worked for those in employment (excluding those in full-time education) | | | |
|---|---|---|---|
| Treatment group 21 year olds; control group 20 year olds | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | -0.834 (0.509) | -0.524 (0.751) | -1.214* (0.680) | -0.928 (0.753) |
| N | 16,341 | 7,919 | 8,422 | 7,536 |
| Treatment group 21 year olds; control group 22 year olds | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | -0.672 (0.480) | -0.242 (0.699) | -1.168* (0.647) | -0.620 (0.771) |
| N | 19,704 | 9,894 | 9,810 | 7,850 |

Note: Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey.*

The results obtained (focusing on the post-recession period) confirm the findings already presented: there is little or no evidence of any significant impact on labour market opportunities of turning 21 in the "after" period when the comparison group is made of 20 year olds. When using the comparison group of 22 year olds, we found some significant differences (especially for males) of turning 21 in the "after" period in relation to inactivity, unemployment and hours worked. This supports the analysis presented in this section and their associated interpretation.

## 4.7    Conclusions

This chapter has estimated the impact of entitlement to the adult rate for 21 year olds across a range of employment outcomes. A difference-in-differences approach has been used, using both 20 year olds and 22 year olds as control groups.

Identifying the effects of entitlement to the adult rate on 21 year olds' employment outcomes is complicated by the changing nature of the labour market following the start of the recession in April 2008. Changes in the labour market mean that it is difficult to identify a reliable counterfactual for the trends that 21 year olds' employment outcomes would have followed in the absence of the policy change. Therefore, the approach taken in this chapter is to place only limited confidence in results unless they are found to be significant relative to both control groups.

The main findings can be summarised as follows.

- There is no evidence of adverse effects on the likelihood of 21 year olds being employed. In fact, there is weak evidence of a positive employment effect for women, although this is only statistically significant when using 20 year olds as the control group and the result is sensitive to the specification used.

- Nevertheless, there may still have been an adverse employment effect on the average number of hours worked – at the *intensive* margin. Yet, whilst point estimates imply an

economically significant effect, the results only have statistical significance for men when those in full-time education are excluded from the estimation. Therefore, the evidence is too weak to place confidence in this result.

There is some evidence that entitlement to the adult rate reduced rates of inactivity, in particular for men. There is also evidence that there was an increase in unemployment for men. Therefore, it appears likely that if entitlement to the adult rate did reduce inactivity, this led to increased unemployment rather than employment. Interestingly, this finding is consistent with the introduction of an above-market clearing minimum wage in a neoclassical model of the labour market

# 5 Understanding of the extent of unpaid internships (RO7)

With the increasing competition for entry-level job opportunities, internships have gained popularity internationally as a means for prospective employees to obtain an insight of the industry or organisation in which they are interested, and to potentially differentiate themselves from other employees to future employers. What is understood by 'an internship' and the associated contractual obligations of the company and the intern, however, varies widely by country and industry, and can be open to interpretation (Stewart and Owens, 2013). Therefore, internships, especially when unpaid are often not covered by employment law, which can have various legal implications (Edwards and Hertel-Fernandez, 2010; Lawton and Potter, 2010). The issue of unpaid internships has been widely discussed in the past few years, especially since their growth during the latest economic downturn (ILO, 2012; Curiele, 2010).

Apart from legal consequences, unpaid internships can also have some significant economic implications. Firstly, unpaid internships can increase socio-economic inequality. Undertaking an unpaid internship as a student or a recent graduate implies incurring the opportunity cost of foregone earnings and potential expenses incurred during the internship (Edwards and Hertel-Fernandez, 2010). Hence, students and recent graduates from low-income backgrounds might find such opportunity costs unaffordable, and instead choose a low-skilled and low wage-paying job in the regular labour market. In addition, there is evidence that internships significantly increase the probability of obtaining a full-time position in most industries (Curiale, 2010). Therefore, students who find unpaid internships unaffordable will have a diminished opportunity of gaining a 'graduate position' position post-graduation compared to those with an internship.

In addition to the decision to incur the opportunity cost of an unpaid internship, the student's socio-economic background also impacts their ability to obtain such an internship in the first instance (Lawton and Potter, 2010). Since unpaid internships adhere to no contractual obligations, they are often not openly advertised but instead, obtained through networks and pre-existing social or business connections. Therefore, students from disadvantaged backgrounds or from families without a family history in certain professions are less likely to obtain an internship.

Such a negative effect of unpaid internships in the UK on socio-economic inequality is further exacerbated geographically by the fact that, according to the survey conducted by the *Panel on Fair Access to the Professions* (2009), the majority of UK internships in key industries are located in London:

- 90% of legal internships;
- 60% of banking and finance internships; and
- approximately 50% of IT internships.

In comparison, 84% of the survey respondents reported that a young member of their family could not afford to undertake an unpaid internship in London. Thus, those from less affluent backgrounds and from regions outside of the South East cannot afford an unpaid internship in London.

Furthermore, internships are often indicated to cause a *substitution effect* in the labour market composition from paid adult workers to unpaid youth workers (Edwards and Hertel-Fernandez, 2010; Curiale, 2010). Specifically, in a weak labour market there may be financial incentives when the skills gap between paid and unpaid workers is not large to substitute unpaid interns for paid workers.

## 5.1 Unpaid internship prevalence: reported estimates

Quantifying the potential impacts of unpaid internships is heavily dependent on the availability of internship data. Researchers in the field always emphasise the scarcity of data as a hurdle to producing a reliable estimate of the prevalence of unpaid internships in the United Kingdom. As a result, the estimates presented here span a wide range (further exacerbated by the scale of the study and its methodology). All estimates should therefore be treated with caution and for indicative purposes only.

According to a survey of employers conducted by the Chartered Institute for Personnel Development (2010), around 280,800 employers planned to hire an intern between the months of April and September 2010. Just over half (**51%**) of the **intern-hiring organisations** (i.e. not necessarily the internships) in 2010 in the UK did not pay their interns at least the minimum wage, and approximately **40%** (of the 51%)  paid nothing or covered travel expenses only. Newer editions of the survey do not report information on the prevalence of unpaid internships.

Other reported estimates of the proportion of unpaid internships for the period between 2011 and 2013 range between 30% and 45%, depending on the source and survey, though these estimates need to be treated with caution:

■    According to the BBC, Graduate Talent Pool, an organisation set up by the Department for Business, Innovation and Skills to promote graduates' employability, advertised around 9,000 internship vacancies as of 2010, of which approximately **a third** only covered expenses (2010).

■    Based on a 2006-2010 graduates' survey conducted by Graduate Prospects, **43%** of all internships undertaken were unpaid (The Guardian, 2011).

■    Over **30%** of a total of 280,000 intern positions advertised in 2012, were unpaid (The Gateway, 2012).

■    **20%** of young people have undertaken an unpaid internship (The Guardian, 2012).

■    **40%** of interns in 2013 were unpaid – an estimate based on a survey of 200 internship-completers over 12 months. **27%** of the internships provided expenses support only, and an additional **14%** did not reimburse their interns at all. Additionally, **22%** of employers admitted to paying below the minimum wage (Monster, 2013).

## 5.2 Evidence of unpaid internships prevalence outside the UK

The prevalence of internships largely depends on the traditions and structure of the labour market in the respective country. However, since the latest economic downturn, internships of some form have started becoming more and more popular internationally (ILO, 2012; Stewart and Owens, 2013). In Australia, Stewart and Owens (2013) have produced an extensive report to the Fair Work Ombudsman to collect information on the prevalence of unpaid internships in the Australian labour market. Much like in the United Kingdom, the lack of data-recording mechanisms for internships leads the estimation to rely largely on anecdotal evidence from various sources.

The authors, however, present results from a survey administered by higher education institutions. According to the study, more than 60% of the staff surveyed were aware of students performing unpaid internships. Additionally, over a third of the respondents reported that the proportion of interns they knew to be unpaid was larger than 50%. On the other hand, close to two thirds of the unpaid interns were known to perform tasks of a direct benefit to their host organisation. In accordance with Australian legislation, this (performing tasks of a direct benefit to

their host organisation) categorises them as workers and entitles them to minimum compensation for their effort. Another internal audit of one Australian higher education institution has revealed that around **90%** of the internship experience opportunities – both at external organisations and with the university itself – were unpaid.

The Australian study (Stewart and Owens, 2013) also provides desk-based research evidence from job portals on the prevalence of unpaid internships. Out of the 76 advertisements from 2 job portals, the majority implicitly or explicitly offered no pay in return for employment tasks and little if any training. Most of these adverts were for opportunities in industries such as media, journalism and other creative industries, PR and marketing, events management and recruitment. The report concluded that a growing number of businesses choose to take on unpaid interns to perform tasks which would otherwise be performed by paid employees, especially in industries where graduate supply significantly exceeds demand. However, much like in the United Kingdom, concrete estimates of the prevalence of unpaid internships cannot be made, due to scarcity of comprehensive and exhaustive data.

## 5.3    Analysis relating to the United Kingdom

*Data sources*

The **Destination of Leavers from Higher Education** (DLHE) annual survey collected by the Higher Education Statistical Agency (HESA) is, to the best of our knowledge, the most reliable dataset containing any information on internships in the UK. The two waves of the HESA DLHE data from 2011/12 and 2012/13 contain a total of around 425,000 respondents in employment in the United Kingdom 6 months after graduation. Out of those, around **2%** (**8,300**) respondents identified their primary employment activity at the reference date to be an **internship**. Additionally, 1.6% (6,700) of the employed respondents self reported to be primarily occupied with voluntary work.

| Table 36: Survey respondents by type of employment | | |
|---|---|---|
| **Basis of employment** | **Frequency** | **Percentage of pooled sample** |
| Self-employed/freelance | 21,219 | 4.99% |
| Starting up own business | 3,029 | 0.71% |
| On a permanent or open-ended contract | 263,811 | 62.08% |
| On a fixed-term contract lasting 12 months or longer | 61,684 | 14.52% |
| On a fixed-term contract lasting less than 12 months | 34,406 | 8.1% |
| Voluntary work | 6,744 | 1.59% |
| On an internship | 8,336 | 1.96% |
| Developing a professional portfolio/creative practice | 1,693 | 0.4% |
| Temping (including supply teaching) | 15,345 | 3.61% |
| Other | 8,690 | 2.04% |
| Total | 424,957 | 100% |

*Source: LE analysis of HESA - Destination of leavers 2011/12-2012/13 data*

It is assumed that all respondents who identified themselves as volunteers cannot be considered employees of the organisation they volunteer for and thus are not subject to the national minimum wage legislation. Therefore, the investigation of the prevalence of unpaid or low-paid internships will be focused solely on respondents who have self-reported as being 'on an internship' six months after graduation.

## 5.3.1 Prevalence of unpaid internships

Only 18 respondents in the pooled survey sample have explicitly stated in the reporting of their job title that they are 'unpaid' interns. Therefore, salary data needs to be analysed to obtain a more realistic estimate of the proportion of interns who are unpaid or paid below the minimum wage.

| Table 37: Salary data availability for university leavers on an internship | | |
|---|---|---|
| | **Frequency** | **Percentage of pooled sample** |
| Unknown | 1,980 | 24% |
| N/A | 3,579 | 43% |
| Salary information provided | 2,777 | 33% |
| **Total** | **8,336** | **100%** |

*Source: LE analysis of HESA - Destination of leavers 2011/12-2012/13 data*

The salary of approximately one-quarter (24%) of the respondents whose main occupation takes the form of an internship 6 months after graduation is 'unknown'. According to the survey design, responses to the salary questions are coded as 'unknown' either if information was not disclosed by the respondent, or if the disclosed annual salary is £0 (HESA, 2013). Thus, a potentially high proportion of unpaid interns might be are classified within the category of 'unknown' salary. Additionally, according to HESA's data definition, salary information is labelled as 'N/A' if the respondent is not in employment. This implies that 43% of interns are not considered to be in either full-time or part-time employment, despite defining themselves as primarily employed on an internship.

Information on annual salary has therefore been collected only for a third of respondents who are on an internship at the reference date and there are no unpaid interns amongst them *by definition* of the data collection process. It is, however, possible to estimate approximately what percentage of the interns in the sample is paid below the national minimum wage for their age. Those interns paid a very low salary could potentially only receive travel or other expenses compensation. This estimation requires the assumption that all respondents who have provided salary data have provided their annual rate of pay. Also, there is no available data on the hours worked to accompany the salary data in the sample, which calls for an estimation of the annual equivalent of the NMW for each age band and each year to act as a benchmark salary level.

NMW rates are revised in October each calendar year. There are two possible reference dates for each Destination of Leavers survey wave – one in April, before the NMW change date, and one in January the following year, after the NMW change. However, since the majority of first degree leavers graduate between January and July, their survey reference date would be January of the following year. Thus, we will assume that for the 2011/2012 wave, the applicable NMW level is the rate set in October 2012. Similarly, for the 2012/2013 wave, the applicable rate would be the rate set in October 2013.

The estimation of an annual rate of the national minimum wage for each age band requires an assumption on the number of hours worked per day. The table below presents two versions of the assumption – a 7-working-hour day (a conservative estimate) and an 8-working-hour day (more realistic estimate). Additionally, the HESA salary data is rounded to the nearest thousand. The annual minimum wage (AMW) estimates are therefore rounded accordingly, for comparability purposes (Table 38).

| Table 38: Annual Minimum Wage assumptions | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Annual minimum wage rate (7hrs/day - Conservative estimate) | | | | Annual minimum wage rate (8hrs/day -Realistic estimate) | | | |
| | 2011/12 | 2011/12 (round) | 2012/13 | 2012/13 (round) | 2011/12 | 2011/12 (round) | 2012/13 | 2012/13 (round) |
| 16-17 rate | £5,866 | £6,000 | £5,930 | £6,000 | £6,704 | £7,000 | £6,777 | £7,000 |
| Development rate (18-20) | £7,938 | £8,000 | £8,018 | £8,000 | £9,072 | £9,000 | £9,163 | £9,000 |
| Adult rate | £9,867 | £10,000 | £10,058 | £10,000 | £11,276 | £11,000 | £11,495 | £11,000 |

*Source: London Economics' analysis*

As presented in Table 38 above, after rounding the AMW rate estimates there are no differences in the 2011/12 and 2012/13 rates. Different assumptions on the length of the working day, however, yield a difference of £1,000 per annum in AMW for each age band. When compared to the annual equivalents of the NMW, it becomes evident that between **13%** and **16%** of all UK interns who have provided details on their salary are paid less than the annual equivalent of the NMW. The estimates vary with the assumed working hours per day, and are presented in Table 39.

| Table 39: Interns' pay | | | | |
|---|---|---|---|---|
| | Conservative AMW estimates (7-hour work day) | | Realistic AMW estimates (8-hour work day) | |
| Salary information provided by respondents on an internship | Frequency | Percentage | Frequency | Percentage |
| Above NMW | 2,419 | 87% | 2,331 | 84% |
| Below NMW | 358 | 13% | 446 | 16% |
| Total | 2,777 | 100% | 2,777 | 100% |

*Source: LE analysis of HESA - Destination of leavers 2011/12-2012/13 data*

Although, the results are based on a much smaller sample (of just under 2,800 interns from two cohorts), it is necessary to remember that the data does not allow us to assess the number of (strictly) unpaid graduate interns; and that graduates completing internships between or during their higher education studies do not respond to the Destination of Leavers survey. As such, the initial estimate of between 13% amd 16% is highly likely to be an underestimate of the total number of interns who are not paid in accordance with minimum wage legislation.

### 5.3.2   Internship pay by sector

Using the same methodology, we have further analysed the differences in proportions of interns paid below the national minimum wage by hiring sector. Figure 5 provides a breakdown of these proportions by sector, as well as the size of each sector in terms of the number of hired interns for the period of 2011-2013.

Due to the large number of represented industries and the small proportion of interns with reported salary, the industry-level break-down produces very small sub-samples for some of the industries. Thus, we focus on the 12 largest intern-hiring industries (Figure 6).

**Figure 5:  Proportion of interns with salary below the AMW**
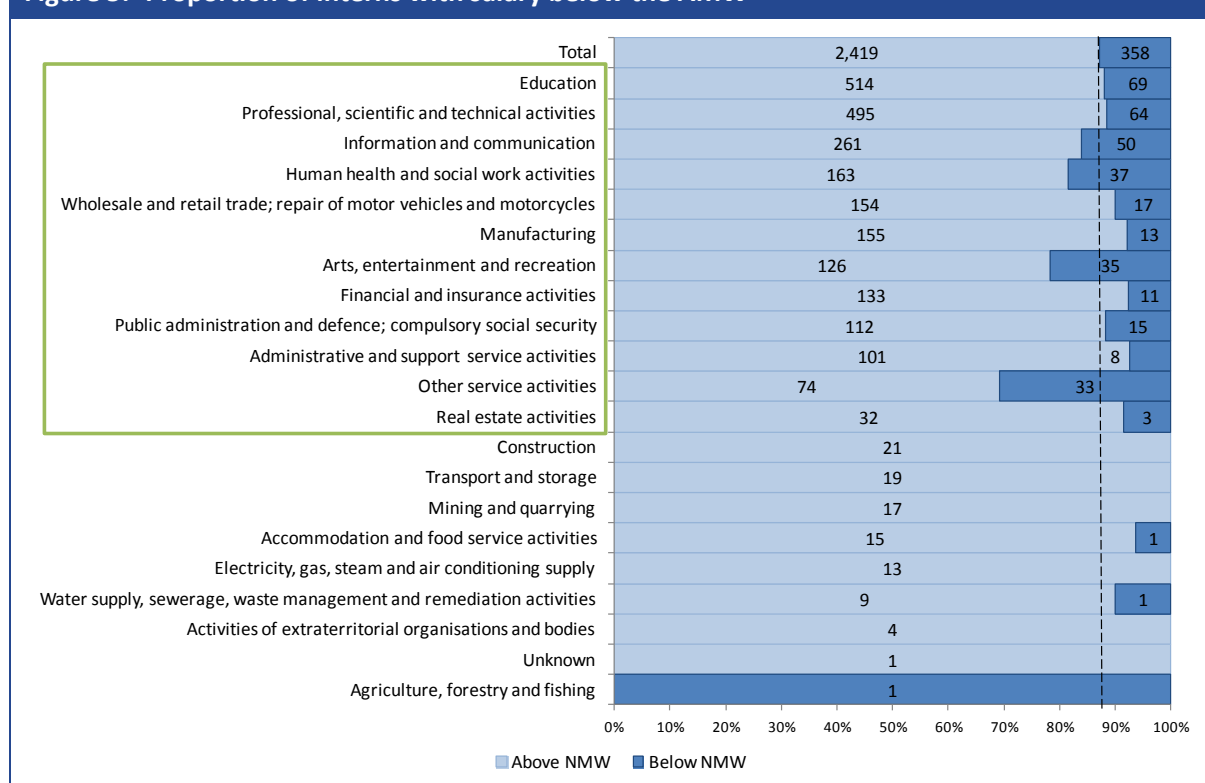


Note: The distribution assumes 7-hour work days; The punctured line represents the overall sample proportion of interns paid below the NMS. *Source: LE analysis of HESA - Destination of leavers 2011/12-2012/13 data*
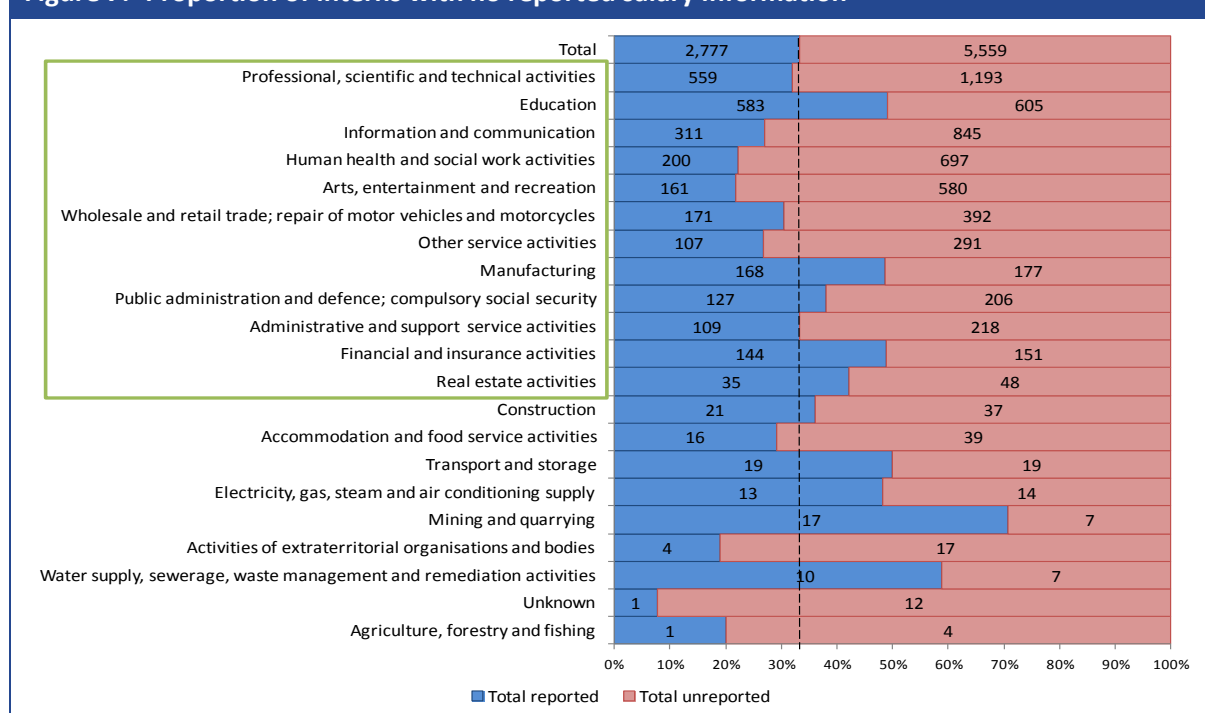
### Below-NMW intern-paying industries

Presented in Figure 6, the 'Human health and social work activities', 'Arts, entertainment and recreation' and 'Other services' are the most notable industries with a higher-than -average probability of hiring interns on a wage below the NMW. The proportion of interns paid below the NMW is larger in the Health and Care industry compared to the average (by **6 percentage points** statistically significant at the 95% confidence level). The corresponding difference for the Arts and Entertainment sector is **9.4 percentage points** (statistically significant at the 99% confidence level). Employers in the 'Other service activities' are **18.6 percentage points** more likely to pay their interns below the NMW than other industries; however interns in this sector are not heavily represented in the data.

### Above-NMW intern-paying industries

The 'Manufacturing', 'Financial and insurance services' and 'Administrative and support service activities' are three of the larger intern-hiring industries and are **less** likely to hire below-NMW-paid interns. Under the 7-hour work day constraint, the proportion of interns in the Manufacturing sector paid below the minimum wage is, on average, lower than that in other sectors by **5.4 percentage points** (statistically significant at the 95% confidence level). Similarly, the proportion of interns in the Financial and insurance services sector who are paid below the NMW is **5.5 percentage points** lower than the corresponding proportion in other sectors (at the 95% confidence level). The corresponding analysis of the Administrative and support services sector is **5.8 percentage points** (statistically significant at the 95% confidence level).

**Figure 6:  Proportion of interns with salary below the AMW – 12 largest intern-hiring SIC sectors**
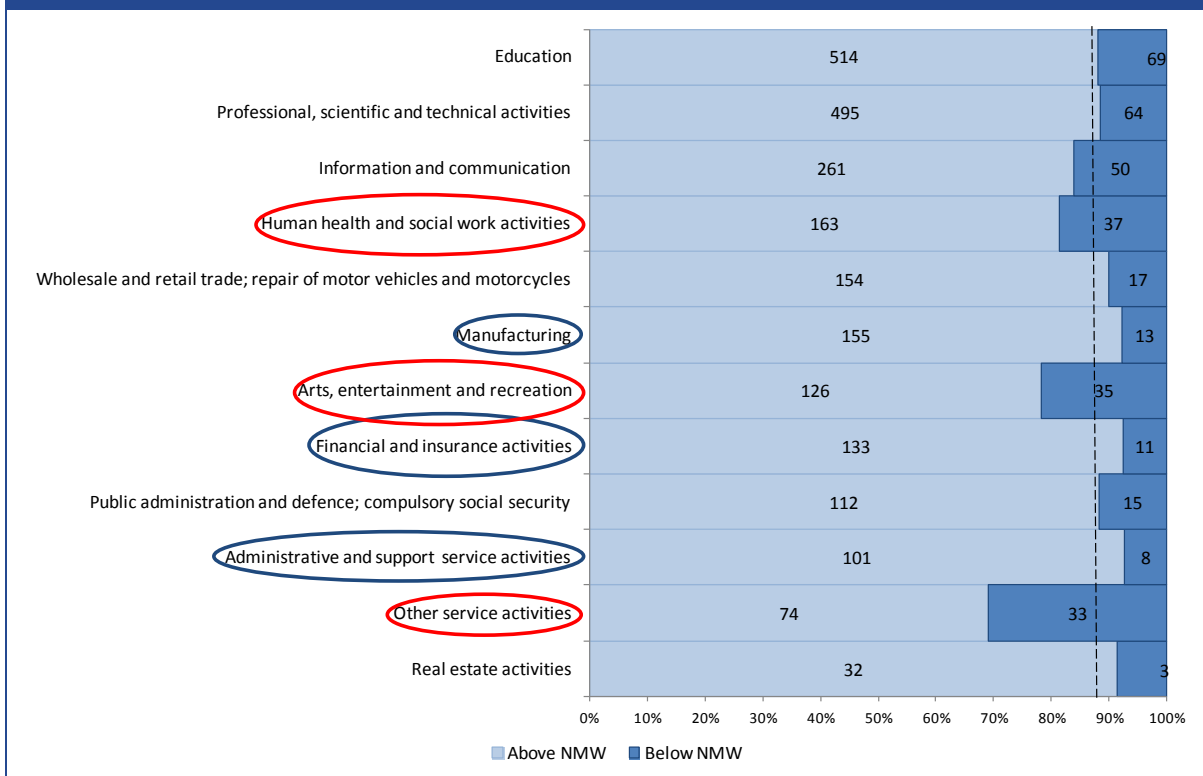


Note: The distribution assumes 7-hour work days; The puncture line represents the overall sample proportion of interns paid below the NMS. **Source: LE analysis of HESA - Destination of leavers 2011/12-2012/13 data**

*Industries with a potentially high prevalence of unpaid interns*

There is a large proportion of the interns in the survey – **67%** - for whom salary data is not available. However, their break-down by industry can be analysed to inform the potential distribution of unpaid interns across industries, under the following two assumptions:

- The correlation between the proportion of interns with unreported salary[16] and the proportion of unpaid interns is high; and
- The respondents' decision not to disclose information on their salary even if they are paid does not depend on the industry in which they are employed.

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[16] Unreported salary may occur because of refusal to disclose; 'unavailability by definition' because of the mismatch between the self reported employment status of the individual and the classification of employment status within DLHE; or because it is in fact zero.

**Figure 7: Proportion of interns with no reported salary information**

| Industry | Total reported | Total unreported |
|---|---|---|
| Total | 2,777 | 5,559 |
| Professional, scientific and technical activities | 559 | 1,193 |
| Education | 583 | 605 |
| Information and communication | 311 | 845 |
| Human health and social work activities | 200 | 697 |
| Arts, entertainment and recreation | 161 | 580 |
| Wholesale and retail trade; repair of motor vehicles and motorcycles | 171 | 392 |
| Other service activities | 107 | 291 |
| Manufacturing | 168 | 177 |
| Public administration and defence; compulsory social security | 127 | 206 |
| Administrative and support service activities | 109 | 218 |
| Financial and insurance activities | 144 | 151 |
| Real estate activities | 35 | 48 |
| Construction | 21 | 37 |
| Accommodation and food service activities | 16 | 39 |
| Transport and storage | 19 | 19 |
| Electricity, gas, steam and air conditioning supply | 13 | 14 |
| Mining and quarrying | 17 | 7 |
| Activities of extraterritorial organisations and bodies | 4 | 17 |
| Water supply, sewerage, waste management and remediation activities | 10 | 7 |
| Unknown | 1 | 12 |
| Agriculture, forestry and fishing | 1 | 4 |

Note: The 'unreported' category includes observations with 'Unknown' salary and observations with 'N/A' salary.
*Source: LE analysis of HESA - Destination of leavers 2011/12-2012/13 data*

If we once again focus on the 12 largest intern-hiring industries, the 'Education', 'Manufacturing' and 'Financial and insurance activities' sectors (which also have a low prevalence of paying interns below the national minimum wage) emerge as those industries in which there is high availability of intern salary information (see Figure 7).

On the other hand, the two most striking examples of industries where the probability of salary being unreported are the 'Human health and social work activities' and the 'Arts, entertainment and recreation' industry sectors (which also have a relatively high incidence of paying interns less than the relevant minimum wage). This information is presented in Figure 8.

This additional evidence would suggest that the incidence of unpaid (or low-paid) interns is significantly in excess of the 13-16% conservative estimates provided earlier in the section.

To place these estimates in context, there are approximately **212,500** graduates per annum contained within each year of the HESA Destination of Leavers from Higher Education. Of this amount, approximately **2%** were engaged in internships 6 months post graduation (i.e. **4,150** per annum). The lower bound estimate of the proportion of interns not receiving the relevant minimum wage stands at approximately **13-16%** (though potentially much higher). This implies that of the 212,500 graduates from UK higher education institutions annually, the *lower bound* estimate of the number on unpaid apprenticeships (in this cohort) stands at between **550** and **700**. However, it is important to note that this information relates to *leavers* from higher education. There is likely to be a higher proportion of individuals undertaking unpaid or low paid internships that are not considered in this analysis – either amongst those that have never undertaken higher education or amongst those that undertake internships during vacation periods.

**Figure 8:  Risk of non-compliance with NMW  legislation when hiring interns, by industry**
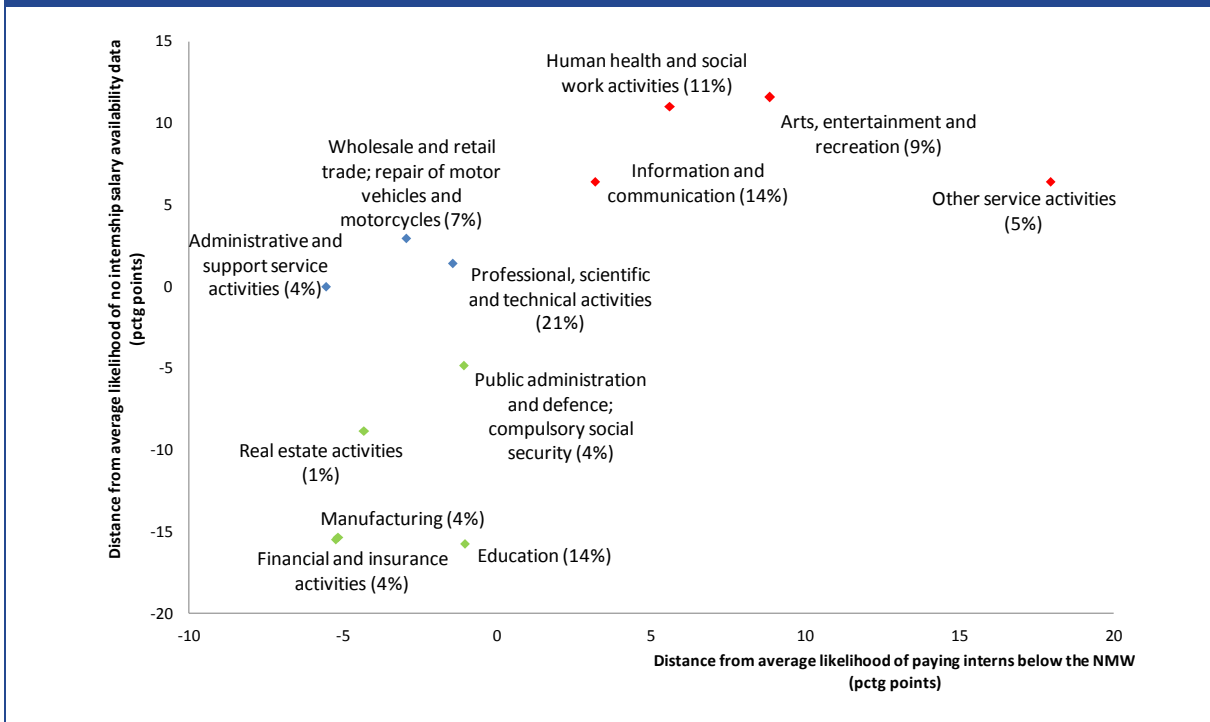


Note: The red points signify that interns hired in the industry are more likely that the average to both be paid below the NMW, and to not report their salary.  Percentages in brackets denote the percentage of all interns in the sample employed in the respective industry in the UK over 2011-2013. Source: LE analysis of HESA - Destination of leavers 2011/12-2012/13 data

# 6 Determinants of undertaking education and training for you young people (RO8)

## 6.1 Background and context

Understanding whether local labour market conditions, particularly the local wage and unemployment rate, affect young people's decision to enter the labour market is another key research question for the Low Pay Commission. It is possible that a variety of different effects take place with respect to local labour market conditions: high wages and low unemployment in the local labour market can spur young individuals to remain in full-time education if expectations are that *qualified* individuals receive a significantly higher wage and face improved labour market opportunities. In addition, credit constraints preventing undertaking further education and learning are also likely to be less binding in a buoyant economic environment. On the other hand, young people might be tempted to leave full-time education and enter the labour market at the age of 16 or 18 given the high opportunity cost of studying. The net effect will depend on the individual's ability and expectations and is likely to vary in response to local labour market conditions.

During a recession, young people might decide to stay in FT education given the relatively scarce opportunities in the labour market, but may be also induced to leave FT education, given credit constraints or lack of future prospects as qualified individuals. The worst outcome occurs when discouraged individuals leave FT education and enter the category of those "Not in Education, Employment or Training" (NEET) instead of pursuing either further training or employment opportunities.

**Data and approaches used in recent literature**

A series of researchers, have recently modelled the factors that have most influence over young people's labour market choices. In particular, recent papers include Crawford et al. (2011), De Coulon *et al.* (2010), Meschi *et al.* (2010). These papers use longitudinal data from the Longitudinal Study of Young People in England (LSYPE), typically combined with administrative data, ASHE data to take a measure of local wages, and a measure of local unemployment for young people from the Annual Population Survey. The geographical dimension of the local labour market is generally identified with the local authority or unitary authority/county, but also the government office region level.

The approaches are generally similar although with a few differences:

- When looking at binary outcomes(e.g. employed/unemployed) Crawford et al. (2011) use a probit model, whereas De Coulon et al. (2010) use a logit model;
- De Coulon et al. (2010) consider the decision to participate in FTE, whereas Crawford et al. (2011) consider five binary outcomes: whether in FTE; whether NEET; whether drops out of FTE, *given* being in FTE the previous year; whether in work, *given* being in FTE; whether in work, *given* not being in FTE.
- Crawford et al. (2011) have access to more waves of data so investigate labour market choices at 17/18 and 18/19, as well as 16/17 as in De Coulon et al. (2010)
- When looking at multivariate outcomes, De Coulon et al (2010) use a multinomial logit model; while Meschi et al. (2010) use a nested logit model.

**Findings from the recent literature**

De Coulon et al. (2010) find that ability and socio-economic status play a primary role as determinants of educational participation, while local labour market conditions play a very small role, if any, in young people's decisions. There is some evidence that those with lower academic attainment are more responsive to local labour market conditions, though the effect is small and normally not statistically significant. Crawford et al. (2011) confirm the finding that local labour market conditions – and local wages in particular – play little or no role in determining the education participation decisions of young people and also find that academic ability and family characteristics are the main determinants of the participation decision. However, they also find 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. Consistent with previous results, Meschi et al. (2010) find that the main determinant of the schooling decision is pupil educational attainment, socioeconomic background and parental aspirations; however, they also find that higher unemployment tends to keep young males in full-time education whereas there is little impact from wages. The opposite is true for females (higher unemployment tends to discourage them from continuing in education), but the result was not statistically significant.

## 6.2  Methodology

We looked at the determinants of young people's decision to stay in or leave education using a binary model. In particular we estimated a binary probit model of choice:

$$P(y = 1|x) = F(xb + zy)$$

where *F* is the cumulative normal distribution, *x* includes individual background characteristics of young people and their families such as:

- Individual characteristics (gender, ethnic background, country of birth[17] and self-reported health);
- Household characteristics (household size, owner/occupier household, reliance on housing or unemployment benefits);
- Parental education[18] and whether the respondent lives with both parents, one parent only or neither parent;

and *z* includes local labour market characteristics:

- Local adult (25+) and youth (16-24) unemployment rate (*entered as quartiles of the national distribution*);
- (log) Difference between average wage in the local area and the national minimum wage (*Average local wage – NMW*);
- Regional and time dummies were also included in the model to control for any residual time and region-specific effects;

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[17] The UK or abroad

[18] Parental education was defined as whether both parents have no qualifications or lower level qualifications (below level 2), whether at least one parent has GCSE or A-levels (or equivalent qualifications) and whether at least one parent has Higher Education qualifications.

*Y* represents the binary outcome of choice and was estimated both looking at the individual choice in a given year and on the choice at time *t* conditioned on being in full-time education at *t-1.* Thus, *Y* was defined alternatively as:

- whether the individual is in FT Education at time *t*;
- whether the individual is in employment at time *t*;
- whether the individual is NEET at time *t*;
- whether the individual is in FTE at time *t* given that they were previously in FT Education;
- whether the individual is in employment at time *t* given that they were previously in FT Education;
- whether the individual is NEET at time *t* given that they were previously in FT Education;

The analysis was repeated at the ages of 17 and 18 and looking at the transitions between the age of 16 and 17 and the age of 17 and 18. For the analysis looking at the transition between *t-1* and *t* (i.e. status at time *t* conditional on being in FT education at time *t-1*), we also included a variable capturing individuals' expectations on staying in school or entering further education (measured at *t-1*).

## 6.3    Data sources

The dataset used in previous studies (the LSYPE) has some clear advantages in terms of richness and quality of the data on personal and family characteristics and the possibility to match with administrative data on school attainment. However, the LSYPE is a sample of young individuals born between September 1989 and August 1990 – in other words a single cohort of young people, followed over time from the academic year when they turn 14 (2003/04) until the year they turn 20 (2009/10). Given that the previous research already analysed choices and outcomes using the LSYPE and that the data only covered a single cohort of individuals, we used a different data source to identify individual and family characteristics.

The individual level data containing personal and family characteristics was drawn from the *Understanding Society* study (wave 1-3) and its predecessor, the *British Household Panel Survey* (BHPS) covering the period 2004-2012[19]. The Understanding Society study covers around 30,000 households and more than 50,000 individuals (including the ethnic minority boost sample) and was first collected in 2009. The study is an annual survey of the UK adult population (aged 16 and over) but also covers young people aged between 10 and 15. Information is collected over a 24 month-period and individuals are interviewed twice in each wave. Three waves are currently available (Wave 1 collected between January 2009 and January 2011; Wave 2 collected between January 2010 and January 2012; and Wave 3 collected between January 2011 and January 2013). The BHPS was based on a much smaller sample (5,000 households and 10,000 individuals) and ran from 1991 to 2008 (we used data from 2004 to 2008).

The information on personal and family characteristics from the Understanding Society/BHPS was complemented with data on local labour market conditions taken from the Annual Population

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[19] It should be noted that the sample size for young people in the Understanding Society/BHPS is smaller than the sample size of the LSYPE and that information on school attainment and other characteristics may not be as rich and comprehensive as in the LSYPE. Also, it is not possible to link the Understanding Society/BHPS with administrative information on school attainment.

Survey.  "Local area" was defined at the Local Authority District (LAD) level and information from all datasets was matched at the LAD level.

## 6.4 Findings relating to the determinants of young people's labour market outcomes

In this section we present the main findings of the analysis: Table 40 shows the results relating to the probability of being in FT Education, Employment or NEET at the ages of 17 and 18, while Table 41 shows the results for the probability of being in full-time education, employment or NEET at the ages of 17 and 18 *conditional* on being in full-time education at *t-1*. For all regressions we show the marginal effects of the coefficients obtained through the probit regression for the labour market variables and parental education. All regressions include the full set of control variables described in section 6.2.

| Table 40: Determinants of the probability of being in FTE/Employment/NEET at the age of 17/18 | | | | | | |
|---|---|---|---|---|---|---|
| | FTE at 17 | FTE at 18 | Employed at 17 | Employed at 18 | NEET at 17 | NEET at 18 |
| Adult unemployment 2nd Quartile | 0.003 | 0.019 | -0.018 | -0.044 | 0.015 | 0.035* |
| | (0.026) | (0.032) | (0.020) | (0.029) | (0.014) | (0.021) |
| Adult unemployment 3th Quartile | -0.003 | 0.069** | -0.011 | -0.077** | 0.020 | 0.019 |
| | (0.028) | (0.033) | (0.022) | (0.031) | (0.015) | (0.019) |
| Adult unemployment 4th Quartile | -0.016 | 0.087** | -0.029 | -0.110*** | 0.037** | 0.031 |
| | (0.028) | (0.035) | (0.023) | (0.033) | (0.016) | (0.022) |
| Youth unemployment 2nd Quartile | 0.049* | -0.007 | -0.009 | -0.020 | -0.035** | 0.026 |
| | (0.026) | (0.034) | (0.020) | (0.027) | (0.017) | (0.021) |
| Youth unemployment 3rd Quartile | 0.038 | 0.028 | -0.025 | -0.032 | -0.011 | -0.002 |
| | (0.027) | (0.035) | (0.021) | (0.029) | (0.019) | (0.021) |
| Youth unemployment 4th Quartile | 0.063** | 0.056 | -0.034 | -0.028 | -0.024 | -0.020 |
| | (0.030) | (0.036) | (0.025) | (0.030) | (0.018) | (0.021) |
| (ln) Average wage distance from adult NMW | 0.071 | 0.196*** | -0.029 | -0.157*** | -0.032 | -0.034 |
| | (0.046) | (0.047) | (0.034) | (0.041) | (0.023) | (0.030) |
| (ln) Average wage distance from youth NMW | 0.023 | -0.011 | -0.014 | 0.010 | -0.004 | 0.003 |
| | (0.017) | (0.019) | (0.013) | (0.015) | (0.011) | (0.015) |
| At least one parent has GCSE or A-levels | 0.041 | 0.040 | 0.003 | 0.024 | -0.029* | -0.058*** |
| | (0.030) | (0.036) | (0.023) | (0.032) | (0.017) | (0.021) |
| At least one parent has Higher Education qualifications | 0.145*** | 0.162*** | -0.063*** | -0.044 | -0.050*** | -0.098*** |
| | (0.028) | (0.031) | (0.021) | (0.028) | (0.017) | (0.021) |
| Observations | 2,947 | 2,917 | 2,900 | 2,884 | 2,947 | 2,917 |

Note: The table reports the marginal effects of the probit regression. All regressions contain the full set of personal and family characteristics as well as time and regional dummies. The reference categories are: Adult Unemployment First Quartile, Youth Unemployment First Quartile, No qualifications or lower level qualifications. Adult: 25+; Youth: 16-24.
*Source: London Economics based on the Understanding Society and the BHPS*

*Noting the fact that education participation decisions are made over a 2 year cycle between 16 and 18*, the results presented in Table 40 suggest that local labour market conditions may play some role in determining labour market choices of young individuals:

- Individuals aged 18 and living in local areas with a higher adult unemployment rate are more likely to be in full-time education and less likely to be in employment. Specifically, the analysis suggests that compared to a young person resident in an area with low levels of adult unemployment (bottom quartile (*the reference category*)), a young person resident in an area of high adult unemployment (top quartile) is approximately 8.7 percentage points (ppt) more likely to be in full-time education at the age of 18 and 11 percentage points less likely to be in employment. These effects are seen to a marginally lesser extent for those young people living in areas of relatively high adult unemployment (3rd quartile)[20].

- Youth unemployment rates have a more tenuous effect, but the sign is consistent with the findings for the adult unemployment rate, with a positive association between higher youth unemployment and being in full-time education. Compared to a young person resident in an area with low levels of youth unemployment (*the reference category*), a young person resident in an area of high youth unemployment (top quartile) is approximately 6 percentage points more likely to be in full-time education at both the age of 17 and 18 (although the latter result is not statistically significant) and around 3 percentage points less likely to be in employment at both the ages of 17 and 18 (although the result is not statistically significant at any age)[21].

- The marginal effects for the probability of being NEET tend to be smaller and are generally positive for the adult unemployment rate suggesting that a higher level of adult unemployment rate in the local area may be positively correlated with the proportion of young people who are not in education, employment or training[22]. Correspondingly, young people in areas where there is low youth unemployment are less likely to be NEET.

- The results also suggest that the greater is the gap between the ***average adult wage*** in the local area and the ***adult NMW***, the higher is the probability of being in full-time education at the age of 18 (and the lower the probability of being in employment). This suggests that young individuals living in *more affluent areas* (which may be collinear with parental education) stay longer in full-time education (possibly because they expect to gain a higher return from investment in education). The marginal effect associated with the youth average wage gap is small and never statistically significant.

As with the previous studies, parental education plays a significant role in determining young people's labour market choices. Young people having at least one parent in possession of higher education qualifications are approximately 14 to 16 percentage points more likely to be in full-time education at the ages of 17 and 18 respectively; approximately 6 percentage points less likely to be in employment at the age of 17 (and 4 percentage points at the age of 18); as well as between 5 and 10 percentage points less likely to be NEET.

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[20] Note that the analysis has been replicated whereby rather than controlling for both adult and youth labour market characteristics simultaneously, we modelled the determinants of being in full-time education, employment or being NEET controlling for just adult labour market characteristics, and just youth labour market characteristics separately. The results do not change significantly from the different model specifications. As expected, the marginal effects become stronger (in magnitude and statistical significance) when controlling for adult unemployment rates only. See Table 61 in the Annex.

[21] These results are also consistent when controlling for youth employment rates only (See Table 62 in the Annex)

[22] The youth unemployment rate seems to have some negative effect on the probability of being NEET, but only at the age of 17, which is more difficult to explain.

In Table 41 we present the results of the analysis of labour market status at time t **conditional** on being in full-time education at t-1. Noting again the fact that education participation decisions are made over a 2 year cycle between 16 and 18, the main findings suggest that:

- Individuals living in areas with a higher adult unemployment rate tend to stay in full-time education (however the effect is not always statistically significant) and tend not to leave full-time education to enter employment. Specifically, the analysis suggests that compared to a young person resident in an area with low levels of adult unemployment (the reference category), a young person aged 17 resident in an area of high adult unemployment (top quartile) is approximately 5 percentage points more likely to be in full-time education and 5 percentage points less likely to be in employment, given that they were in full-time education at the age of 16. This result persists in the sense that a young person aged 18 resident in an area of high adult unemployment (top quartile) in full time education at the age of 17 is a further 5 percentage points more likely to stay in full-time education and 9.3 percentage points less likely to be in employment at the age of 18. [23]

- Higher youth unemployment rates result in lower probability of being employed aged 18 assuming participation in education in the previous year (although the effect is never statistically significant). The different sign at the age of 17 and 18 may reflect to some extent the effect of 2-year courses for A-levels, with young people moving out of full-time education only when there are concrete prospects of employment. The equivalent results in relation to the impact of youth unemployment rates on the participation in education show a positive association between youth unemployment rate and staying in full-time education (conditional on being in full time education in the previous year), with an effect in the top unemployment quartile around 7 percentage points. On the other hand, the estimated marginal effects of youth unemployment rates on the probability of staying in full-time education between the age of 16 and 17 are small and never statistically significant.

- Potentially reflecting the general affluence of a particular area, the adult wage gap has a positive effect on the probability of staying in full-time education at both ages and a negative effect on the probability of moving to employment or becoming NEET, although the effects are seldom statistically significant. The youth wage gap has some negative effect on the transition to employment and some positive effect on the transition to NEET between the age of 16 and 17, suggesting that individuals living in areas with higher youth wages may be less likely to leave full-time education for employment between the age of 16 and 17 and more likely to become NEET. No significant effect is found for the transition between the age of 17 and 18, and the estimated marginal effects are much smaller in magnitude.

- Having at least one parent with higher education is positively associated with the probability of staying in FT Education and negatively associated with the probability of leaving full-time education to enter employment or become NEET (although the negative effect is never statistically significant). The result suggests that family characteristics play

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[23] This latter result is more pronounced when controlling for adult rates only – rising to 10.5 percentage points. See Table 63 in the Annex.

a significant role in the decision of staying in full-time education, with young individuals having at least one parent with HE education being more likely to stay in education.

- Individual expectations of staying in education (measured at *t-1*) are a significant driver on the probability of staying in or leaving full-time education: they are positively associated with the probability of staying in full-time education and negatively associated with the probability of leaving full-time education for employment or NEET. Thus, individual expectations, reflecting individual motivations, play a significant role in the decision of staying or leaving full-time education for employment (or to become NEET).

| Table 41: Determinants of the probability of being in FTE/Employment/NEET at the age of 17/18 conditional on being in FTE at t-1 | | | | | | |
|---|---|---|---|---|---|---|
| | FTE at 17/ FTE at 16 | FTE at 18/ FTE at 17 | Employed at 17/ FTE at 16 | Employed at 18/ FTE at 17 | NEET at 17/ FTE at 16 | NEET at 18/ FTE at 17 |
| Adult unemployment 2nd Quartile | 0.005 | 0.004 | -0.004 | -0.023 | 0.001 | 0.002 |
| | (0.033) | (0.044) | (0.023) | (0.040) | (0.021) | (0.018) |
| Adult unemployment 3th Quartile | -0.036 | 0.099** | 0.023 | -0.126*** | 0.003 | 0.020 |
| | (0.036) | (0.046) | (0.026) | (0.039) | (0.021) | (0.019) |
| Adult unemployment 4th Quartile | 0.054 | 0.052 | -0.052** | -0.093** | 0.004 | 0.039* |
| | (0.034) | (0.048) | (0.023) | (0.040) | (0.022) | (0.023) |
| Youth unemployment 2nd Quartile | 0.012 | 0.055 | -0.017 | -0.034 | 0.005 | -0.023 |
| | (0.032) | (0.041) | (0.023) | (0.034) | (0.018) | (0.026) |
| Youth unemployment 3rd Quartile | 0.003 | 0.042 | 0.006 | -0.031 | -0.014 | -0.016 |
| | (0.033) | (0.042) | (0.024) | (0.034) | (0.017) | (0.027) |
| Youth unemployment 4th Quartile | -0.038 | 0.073* | 0.031 | -0.029 | 0.011 | -0.040 |
| | (0.036) | (0.044) | (0.029) | (0.038) | (0.018) | (0.027) |
| (ln) Average wage distance from adult NMW | 0.067 | 0.056 | -0.010 | -0.043 | -0.050* | -0.010 |
| | (0.050) | (0.056) | (0.035) | (0.048) | (0.029) | (0.030) |
| (ln) Average wage distance from youth NMW | 0.004 | 0.033 | -0.036** | -0.031 | 0.025* | 0.003 |
| | (0.023) | (0.023) | (0.017) | (0.023) | (0.015) | (0.015) |
| At least one parent has GCSE or A-levels | -0.008 | 0.028 | 0.019 | 0.007 | -0.001 | -0.032 |
| | (0.036) | (0.041) | (0.025) | (0.034) | (0.021) | (0.023) |
| At least one parent has Higher Education qualifications | 0.078** | 0.080* | -0.033 | -0.032 | -0.028 | -0.035 |
| | (0.036) | (0.044) | (0.026) | (0.035) | (0.021) | (0.023) |
| Expecting to stay in education/FE | 0.091*** | 0.101*** | -0.038** | -0.047** | -0.032** | -0.035*** |
| | (0.022) | (0.027) | (0.017) | (0.022) | (0.013) | (0.014) |
| Observations | 1,424 | 1,358 | 1,408 | 1,349 | 1,424 | 1,358 |

Note: The table reports the marginal effects of the probit regression. All regressions contain the full set of personal and family characteristics as well as time and regional dummies. The reference categories are: Adult Unemployment First Quartile, Youth Unemployment First Quartile, No qualifications or lower level qualifications. All variables are measured at *t-1*. Adult: 25+; Youth: 16-24.

*Source: London Economics based on the Understanding Society and the BHPS*

## Conclusions

In terms of understanding the determinants of undertaking and training, the analysis demonstrated that:

- Individuals aged 18 and living in local areas with a higher adult and/or youth unemployment rate are more likely to be in full-time education and less likely to be in employment.

- The results also suggest that the greater is the gap between the *average adult wage* in the local area and the *adult rate of the NMW*, the higher is the probability of being in full-time education at the age of 18, and the lower the probability of being in employment. This suggests that young individuals living in *m*ore affluent areas stay longer in full-time education.

- Parental education plays a significant role in determining young people's labour market choices. Young people having at least one parent in possession of higher education qualifications are approximately 14 to 16 percentage points more likely to be in full-time education at the ages of 17 and 18 respectively; approximately 6 percentage points less likely to be in employment at the age of 17 (and 4 percentage points at the age of 18).

Furthermore, controlling for being in full-time education in the previous year, *and mindful of the fact that education participation decisions are made over a 2 year cycle between 16 and 18*, the analysis suggests that:

- Individuals living in areas with a higher adult unemployment rate tend to stay in full-time education and tend not to leave full-time education to enter employment.

- The probability of moving from full-time education to NEET between the age of 17 and 18 seems to be (weakly) positively associated with a higher adult unemployment rate and (weakly) negatively associated with a higher youth unemployment rate.

- The adult wage gap has a positive effect on the probability of staying in full-time education at both ages and a negative effect on the probability of moving to employment or becoming NEET, although the effects are seldom statistically significant.

# 7 Is there evidence to support changing the current age bands of the UK NMW? (RO6)

London Economics were commissioned by the Low Pay Commission to undertake an analysis of various issues relating to the impact of the minimum wage on young people. In particular, there were three dominant areas of research:

- the first element of the analysis builds on previous research in the area to better understand the impact of the **relative freeze** in the Youth Development Rate and 16-17 Year Old Rate that occurred from 2011 compared to the adult rate of the National Minimum Wage.
- The second element of the analysis considered the impact of the **reduction in the threshold age** for the adult rate of the National Minimum Wage that occurred in October 2010, and the labour market implications this had for young people aged between the old and the new age thresholds.
- The third main element of the analysis explores the impact of **raising the participation age** on the determinants of undertaking education and training, and the extent to which local labour market conditions affect the labour force participation of young people

  In addition to these main strands of research, additional analysis was undertaken to estimate the extent of unpaid or low-paid internships.

**What was the impact of the relative freeze in the minimum wage on young persons' labour market outcomes?**

This chapter addresses two key questions:

1) Did the slowdown and subsequent freeze in the minimum wages for young people influence employment rates for those eligible for the two youth rates?

Initially, this question is addressed using a descriptive analysis examining the evolution of employment rates before and after each uprating for individuals qualifying for the 16-17 Year Old Rate and the Youth Development Rate from 2003 to 2013.

Across <u>all</u> individuals eligible for the Youth Development Rate, compared to a decline in employment between 2007-08 and 2011-12 from **56%** to **45%**, the slow-down and subsequent freeze in the Youth Development Rate **appears to have stabilised the average employment rate for qualifying individuals** (remaining at 45%). Similarly, across all individuals eligible for the 16-17 Year Old Rate, compared to a decline in employment between 2007-08 and 2011-12 from **32%** to **22%**, **the slow-down and subsequent freeze in the 16-17 Year Old Rate appears to have also stabilised the average employment rate for qualifying individuals** - standing at approximately **21%** since the freeze.

Tracking the <u>same</u> individuals eligible for the 16-17 Year Old Rate (between 2003 and 2013), employment rates before and after the October uprating have generally increased for these individuals. In contrast, from the onset of the recession (2008 to 2010), the average employment rates for individuals qualifying for the Youth Development Rate have declined following the October uprating. However, since the slower growth in the Youth Development Rate relative to

the adult rate of the National Minimum Wage in October 2011, and the subsequent freeze in the in the Youth Development Rate in October 2012, **employment rates have risen**, thereby restoring the historic patterns of stable employment.

Undertaking a difference-in-difference analysis, the relative employment of young people (aged 16-20) was assessed (compared to individuals aged 21 or 22). The analysis was undertaken for a range of time periods around the time of the announcement or implementation of the freeze in the relevant minimum wages, but also covering the period of relative slowdown and subsequent freeze in the minimum wage.

- The results suggest that there is strong and statistically significant evidence of a positive impact on employment rates for young people. More specifically, individuals aged between 16 and 20 were **2.5 percentage points more likely to be employed** compared to individuals aged 21 and 22 as a result of the slowdown and freeze in the two youth rates. A similar positive impact is achieved when the estimation is carried out by gender and for 'low-skilled' individuals (those with highest qualification at or below 5 or more GCSEs at grades A\*-C).
- In addition, **there is evidence to suggest that employment rates for 'low-skilled' individuals improved upon the announcement of the freeze in March 2012**. In particular, individuals eligible for the 16-17 Year Old Rate (Youth Development Rate) experienced, on average, an **increase of 3.4 (3.8) percentage points in their employment rates** compared to individuals aged 21 and 22 when the freeze in the rates was announced.

2) Did the freeze in the Youth Development Rate have an effect on labour market outcomes for individuals on becoming eligible for the adult rate?

This question was addressed using econometric modelling. Using information from the Labour Force Survey, we adopted a regression discontinuity design to examine the impact of National Minimum Wage policy on labour market outcomes for young people. Specifically, we investigated the effect of the freeze in the Youth Development Rate (for 18 to 20/21 year olds) relative to the adult rate (21 or 22 year olds and above) on employment outcomes for individuals who were six months either side of the threshold age. We achieved this by dividing the LFS data into two periods, namely:

(v) *'Lower-jump'* period October 2006 to September 2011, where the increase in the minimum wage on becoming eligible for the adult rate was steady at around 20% and;
(vi) *'Higher-jump'* period October 2011 to September 2013, where the increase in the minimum wage was considerably higher.

**Overall, we found that there was no detrimental labour market impact of becoming eligible for the adult rate of the National Minimum Wage.**

At an aggregate level, our results suggest that there is **no statistical evidence of an impact on employment prospects across young people**. However, when we restrict our sample to consider 'low-skilled' individuals only (defined as individuals with highest qualification equivalent to GCSEs, other or no qualification), the results are more striking.

- In the 'lower-jump' period, our results are consistent with previous studies which suggest that there is a positive impact on employment outcomes when low-skilled workers become entitled to the adult rate. In particular, we find a **positive and significant** impact

for young men, equivalent to an increase of around 9.8 percentage points in their employment prospects when they qualify for the adult rate compared to individuals who were six months below the threshold age. We also find a positive impact for young women in this period, but the effect is statistically insignificant.

■ The results in the 'higher-jump' period contrast those seen in the 'lower-jump' period, with the model identifying a strongly negative impact on employment outcomes for both men and women. **However, after a closer examination of the data and robustness checks, the results seem to be driven by discontinuities in the data, as opposed to minimum wage policy**. Moreover, given the relatively small samples in this period, we believe the true impact will only become clear as more data becomes available.

■ We find that in both periods, changes in employment appear to be a result of changes in the level of unemployment, but there is also a small negative impact at the threshold age on hours worked by young people.

We also attempt to disentangle the impact of the recession on labour market outcomes for individuals from the potential labour market outcomes associated with becoming eligible for the adult rate of the NMW. Using a similar approach to the above analysis, we find that **there is no detrimental labour market impact of becoming eligible for the adult rate during the recessionary period**, whereas there was a positive labour market impact of becoming eligible for the adult rate in the pre-recession period.

## Impact of the change in the eligibility threshold on labour market outcomes

Following the change in the eligibility criteria for the adult rate of the National Minimum Wage in October 2010, we estimated the impact of entitlement to the adult rate on 21 year olds across a range of employment outcomes. To achieve this, a **difference-in-difference** approach was adopted, using both 20 year olds and 22 year olds as control groups.

However, identifying the effects of entitlement to the adult rate on 21 year olds' employment outcomes was further complicated by the changing nature of the labour market following the start of the recession in April 2008. The main findings can be summarised as follows.

• Following the change in the age threshold, there was **no evidence of adverse effects on the likelihood of 21 year olds being employed**. In fact, there is weak evidence of a positive employment effect for women, although this is only statistically significant when using 20 year olds as the control group and the result is sensitive to the specification used.

• Nevertheless, there may still have been an adverse employment effect on the average number of hours worked. Whilst point estimates imply an effect, the results only have statistical significance for men when those in full-time education are excluded from the estimation. Therefore, the evidence is too weak to place confidence in this result.

• There was some evidence that entitlement to the adult rate reduced inactivity rates, in particular for men, with a parallel increase in unemployment. Therefore, it appears likely that if entitlement to the adult rate did reduce inactivity, this led to increased unemployment rather than employment.

### Determinants of undertaking education and training

Understanding whether local labour market conditions, particularly the local wage and unemployment rate, affect young people's decisions to enter the labour market is another key research question. Using individual level data containing personal and family characteristics from the *Understanding Society* study and its predecessor, the *British Household Panel Survey* (BHPS) over the period 2004-2012, this data was complemented with information on local labour market conditions taken from the **Annual Population Survey**. The analysis focused on a range of labour market outcomes (employed, in full-time education or 'not in education, employment or training (NEET)), as well as labour market outcomes conditional on being in full-time education at the age of 16 or 17. The analysis demonstrated that:

- Individuals aged 18 and living in local areas with a higher adult unemployment rate are more likely to be in full-time education and less likely to be in employment.
- Youth unemployment rates have a more tenuous effect, however, the sign is consistent with the findings for the adult unemployment rate, demonstrating a positive association between higher youth unemployment and being in full-time education.
- The results suggest that the greater is the gap between the *average adult wage* in the local area and the *adult rate of the NMW*, the higher is the probability of being in full-time education at the age of 18, and the lower the probability of being in employment. This suggests that young individuals living in *mo*re affluent areas stay longer in full-time education (possibly because they expect to gain a higher return from investment in education).
- Parental education plays a significant role in determining young people's labour market choices. Young people having at least one parent in possession of higher education qualifications are approximately 14 to 16 percentage points more likely to be in full-time education at the ages of 17 and 18 respectively; approximately 6 percentage points less likely to be in employment at the age of 17 (and 4 percentage points at the age of 18).

Controlling for being in full-time education in the previous year, *and mindful of the fact that education participation decisions are made over a 2 year cycle between 16 and 18*, the analysis suggests that:

- Individuals living in areas with a higher adult unemployment rate tend to stay in full-time education and tend not to leave full-time education to enter employment.
- The probability of moving from full-time education to NEET between the age of 17 and 18 seems to be (weakly) positively associated with a higher adult unemployment rate and (weakly) negatively associated with a higher youth unemployment rate.
- The adult wage gap has a positive effect on the probability of staying in full-time education at both ages and a negative effect on the probability of moving to employment or becoming NEET, although the effects are seldom statistically significant.

### The extent of unpaid or low-paid internships

- To understand the incidence of unpaid or low-paid internships, we accessed the 2011-12 and 2012-13 HESA **Destinations of Leavers from Higher Education** (DLHE) data. The analysis found that six months post-graduation, there are approximately **212,500** graduates per annum, of which approximately **2%** were engaged in internships (i.e. **4,150** per annum). Our analysis suggests that the **lower bound** estimate of the proportion of

interns not receiving the relevant minimum wage stands at approximately **13-16%** (though possibly much higher as a result of the classification of earnings information associated with unpaid internships).

At industry level, 'Human health and social work activities' and 'Arts, entertainment and recreation' were the industries with the highest share of interns being paid below the relevant minimum wage. However, these were also the industries with the highest incidence of unreported or unclassified earnings, which suggests that the incidence of unpaid or low-paid internships could be substantially higher (although still small in absoluter terms).

## Overall conclusions

**Given the results of the analysis, our conclusion is that the relative freeze in the minimum wages benefitted the employment outcomes of eligible young people, while the change in the threshold age of entitlement had no detrimental effect on the employment outcomes of young people. Our analytical assessment is that there is no evidence to warrant a policy change in the current age bands of the UK National Minimum Wage.**

# BACKGROUND MATERIAL

# Glossary

## Terminology abbreviations

NMW         National Minimum Wage

LFS         Labour Force Survey

BHPS        British Household Panel Survey

ASHE        Annual Survey of Hours and Earnings

OLS         Ordinary Least Squares (regression)

## Member State codes

| | | | |
|---|---|---|---|
| BE | Belgium | LT | Lithuania |
| BG | Bulgaria | LU | Luxembourg |
| CZ | Czech Republic | HU | Hungary |
| DK | Denmark | MT | Malta |
| DE | Germany | NL | Netherlands |
| EE | Estonia | AT | Austria |
| IE | Ireland | PL | Poland |
| EL | Greece | PT | Portugal |
| ES | Spain | RO | Romania |
| FR | France | SI | Slovenia |
| HR | Croatia | SK | Slovakia |
| IT | Italy | FI | Finland |
| CY | Cyprus | SE | Sweden |
| LV | Latvia | UK | United Kingdom |

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# Index of Tables, Figures and Boxes

## Tables

# ANNEXES

# Annex 1    Supplementary results

## A1.1    Research Objective 3 (section 3)

**Figure 9:  Economic activity of 'low-skilled' young people from 2003 to 2013**
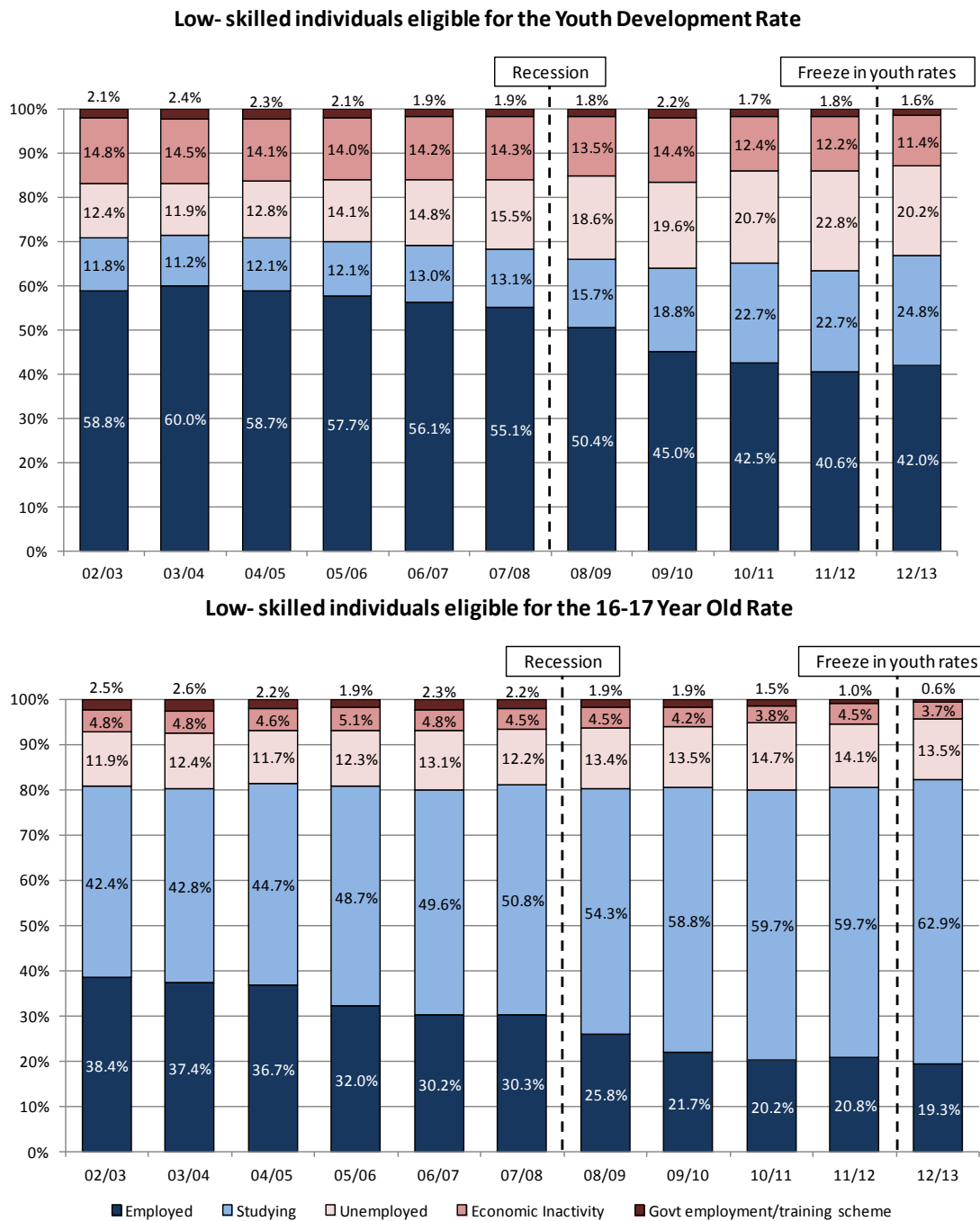
**Low- skilled individuals eligible for the Youth Development Rate**



**Low- skilled individuals eligible for the 16-17 Year Old Rate**



■ Employed  ■ Studying  ■ Unemployed  ■ Economic Inactivity  ■ Govt employment/training scheme

Note: Analysis excludes self-employed and unpaid family workers.
*Source: London Economics' analysis using Labour Force Survey*

| **Table 42: Average employment rates for the treatment and control groups; Males only** | | | | | | |
|---|---|---|---|---|---|---|
| | (i) | | (ii) | | (iii) | |
| | 'Before' | 'After' | 'Before' | 'After' | 'Before' | 'After' |
| Control group (21 and 22 year olds) | 60.9% | 58.2% | 57.8% | 58.6% | 56.9% | 58.7% |
| Treatment group | | | | | | |
| − 16 to 20 year olds | 33.4% | 32.3% | 32.9% | 31.6% | 31.8% | 32.5% |
| − 16 to 17 year olds | 18.8% | 18.6% | 19.8% | 17.3% | 19.8% | 18.2% |
| − 18 to 20 year olds | 44.1% | 43.1% | 43.0% | 43.1% | 40.8% | 43.9% |

Note: (i) Impact of the slower growth and subsequent freeze, (ii)   Impact of the implementation of the freeze and (iii)      Impact of the announcement of the freeze
*Source: London Economics' analysis using Labour Force Survey*

| **Table 43: Average employment rates for the treatment and control groups; Females only** | | | | | | |
|---|---|---|---|---|---|---|
| | (i) | | (ii) | | (iii) | |
| | 'Before' | 'After' | 'Before' | 'After' | 'Before' | 'After' |
| Control group (21 and 22 year olds) | 57.6% | 57.4% | 57.8% | 58.6% | 54.6% | 58.4% |
| Treatment group | | | | | | |
| − 16 to 20 year olds | 36.8% | 37.6% | 37.6% | 37.7% | 36.7% | 38.0% |
| − 16 to 17 year olds | 25.1% | 24.5% | 24.7% | 24.1% | 24.4% | 24.5% |
| − 18 to 20 year olds | 45.5% | 47.2% | 46.8% | 47.5% | 45.4% | 47.8% |

Note: (i) Impact of the slower growth and subsequent freeze, (ii)   Impact of the implementation of the freeze and (iii)      Impact of the announcement of the freeze
*Source: London Economics' analysis using Labour Force Survey*

| **Table 44: Average employment rates for the treatment and control groups; 'Low-skilled' only** | | | | | | |
|---|---|---|---|---|---|---|
| | (i) | | (ii) | | (iii) | |
| | 'Before' | 'After' | 'Before' | 'After' | 'Before' | 'After' |
| Control group (21 and 22 year olds) | 55.2% | 52.3% | 52.3% | 52.3% | 52.6% | 52.1% |
| Treatment group | | | | | | |
| − 16 to 20 year olds | 29.5% | 28.4% | 28.7% | 28.1% | 28.3% | 28.4% |
| − 16 to 17 year olds | 20.2% | 20.1% | 20.8% | 19.3% | 20.3% | 20.0% |
| − 18 to 20 year olds | 42.5% | 41.2% | 40.6% | 42.0% | 39.8% | 41.8% |

Note: (i) Impact of the slower growth and subsequent freeze, (ii)   Impact of the implementation of the freeze and (iii)      Impact of the announcement of the freeze
*Source: London Economics' analysis using Labour Force Survey*

| Table 45: Employment outcomes; High-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'lower-jump' period | | | 'higher-jump' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | -0.035 (0.0237) | -0.059** (0.0290) | -0.007 (0.0236) | -0.033 (0.0504) | -0.040 (0.0414) | -0.032 (0.0631) |
| Observations | 9,551 | 6,327 | 7,052 | 5,404 | 2,497 | 2,907 |

Note: Reported coefficients are marginal effects. 'lower-jump' period - October 2006 to September 2011 and 'higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * p < 0.10, ** p < 0.05, *** p < 0.01. *Source: London Economics' analysis using the Labour Force Survey*

| Table 46: Employment outcomes excluding the birthday month; All individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'lower-jump' period | | | 'higher-jump' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | 0.060*** (0.017) | 0.044 (0.035) | 0.078*** (0.025) | 0.010 (0.0275) | -0.023 (0.0536) | 0.035 (0.0485) |
| Observations | 20,633 | 9,923 | 10,710 | 7,706 | 3,718 | 3,988 |

Note: Reported coefficients are marginal effects. 'lower-jump' period - October 2006 to September 2011 and 'higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * p < 0.10, ** p < 0.05, *** p < 0.01. *Source: London Economics' analysis using the Labour Force Survey*

| Table 47: | Falsification test - Employment outcomes excluding the birthday month (One year after); Low-skilled individuals | | | | | |
|---|---|---|---|---|---|---|
| | 'lower-jump' period | | | 'higher-jump' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | 0.019 (0.0561) | 0.052 (0.0648) | -0.023 (0.0564) | 0.073* (0.0416) | 0.183** (0.0734) | -0.089* (0.0497) |
| Observations | 8,118 | 3,817 | 4,301 | 2,617 | 1,318 | 1,299 |

Note: Reported coefficients are marginal effects. 'lower-jump' period - October 2006 to September 2011 and 'higher-jump' period - October 2011 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * p < 0.10, ** p < 0.05, *** p < 0.01. *Source: London Economics' analysis using the Labour Force Survey*

| Table 48: Recession analysis – Falsification test - Employment outcomes (One year before); Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Pre-recession' period | | | 'Recession' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | 0.052 (0.0378) | 0.116* (0.0656) | -0.023 (0.0229) | -0.046 (0.0310) | -0.065** (0.0287) | -0.038 (0.0502) |
| Observations | 10,080 | 4,927 | 5,153 | 9,064 | 4,667 | 4,397 |

Note: Reported coefficients are marginal effects. . 'Pre-recession' period - January 2003 to March 2008 and 'Recession' period - April 2008 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * p < 0.10, ** p < 0.05, *** p < 0.01. *Source: London Economics' analysis using the Labour Force Survey*

| Table 49: Recession analysis – Falsification test - Employment outcomes (One year after); Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Pre-recession' period | | | 'Recession' period | | |
| | (1)<br>**All** | (2)<br>**Males** | (3)<br>**Females** | (4)<br>**All** | (5)<br>**Males** | (6)<br>**Females** |
| Discontinuity | 0.008<br>(0.0326) | 0.021<br>(0.0300) | -0.010<br>(0.0360) | 0.017<br>(0.0266) | 0.074***<br>(0.0250) | -0.036<br>(0.0411) |
| Observations | 10,038 | 4,488 | 5,550 | 8,593 | 4,203 | 4,390 |

Note: Reported coefficients are marginal effects. . 'Pre-recession' period - January 2003 to March 2008 and 'Recession' period - April 2008 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Source: London Economics' analysis using the Labour Force Survey*

| Table 50: Recession analysis – Falsification test - Employment outcomes excluding birthday month (One year before); Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Pre-recession' period | | | 'Recession' period | | |
| | (1)<br>**All** | (2)<br>**Males** | (3)<br>**Females** | (4)<br>**All** | (5)<br>**Males** | (6)<br>**Females** |
| Discontinuity | -0.005<br>(0.0320) | 0.011<br>(0.0422) | -0.027<br>(0.0401) | -0.027<br>(0.0360) | -0.045<br>(0.0972) | -0.017<br>(0.105) |
| Observations | 9,328 | 4,540 | 4,788 | 8,913 | 4,611 | 4,302 |

Note: Reported coefficients are marginal effects. . 'Pre-recession' period - January 2003 to March 2008 and 'Recession' period - April 2008 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Source: London Economics' analysis using the Labour Force Survey*

| Table 51: Recession analysis – Falsification test - Employment outcomes excluding birthday month (One year after); Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Pre-recession' period | | | 'Recession' period | | |
| | (1)<br>**All** | (2)<br>**Males** | (3)<br>**Females** | (4)<br>**All** | (5)<br>**Males** | (6)<br>**Females** |
| Discontinuity | 0.044<br>(0.0446) | 0.043<br>(0.0545) | 0.038<br>(0.0353) | 0.010<br>(0.0484) | 0.073<br>(0.0560) | -0.057<br>(0.0653) |
| Observations | 9,276 | 4,143 | 5,133 | 7,890 | 3,860 | 4,030 |

Note: Reported coefficients are marginal effects. . 'Pre-recession' period - January 2003 to March 2008 and 'Recession' period - April 2008 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Source: London Economics' analysis using the Labour Force Survey*

| Table 52: Recession analysis – Unemployment outcomes; Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Pre-recession' period | | | 'Recession' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | -0.007 (0.00667) | -0.009 (0.0171) | -0.003 (0.00629) | 0.008 (0.0262) | -0.004 (0.0301) | 0.018 (0.0320) |
| Observations | 10,365 | 4,961 | 5,404 | 9,082 | 4,709 | 4,373 |

Note: Reported coefficients are marginal effects. . 'Pre-recession' period - January 2003 to March 2008 and 'Recession' period - April 2008 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * p < 0.10, ** p < 0.05, *** p < 0.01. *Source: London Economics' analysis using the Labour Force Survey*

| Table 53: Recession analysis – Economic inactivity; Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Pre-recession' period | | | 'Recession' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | -0.035** (0.0158) | -0.028*** (0.00861) | -0.039 (0.0297) | -0.013 (0.0318) | 0.002 (0.0192) | -0.019 (0.0596) |
| Observations | 10,365 | 4,944 | 5,404 | 9,082 | 4,709 | 4,373 |

Note: Reported coefficients are marginal effects. . 'Pre-recession' period - January 2003 to March 2008 and 'Recession' period - April 2008 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * p < 0.10, ** p < 0.05, *** p < 0.01. *Source: London Economics' analysis using the Labour Force Survey*

| Table 54: Recession analysis – Hours worked; Low-skilled individuals | | | | | | |
|---|---|---|---|---|---|---|
| | 'Pre-recession' period | | | 'Recession' period | | |
| | (1) All | (2) Males | (3) Females | (4) All | (5) Males | (6) Females |
| Discontinuity | -1.734** (0.727) | -0.816 (0.698) | -2.580** (0.862) | -0.560 (1.603) | -1.383 (1.901) | -0.121 (1.518) |
| Observations | 6,318 | 3,297 | 2,919 | 4,667 | 2,587 | 2,080 |

Note: Reported coefficients are marginal effects. . 'Pre-recession' period - January 2003 to March 2008 and 'Recession' period - April 2008 to September 2013. Robust standard errors in parentheses adjusted for clustering on age in months. * p < 0.10, ** p < 0.05, *** p < 0.01. *Source: London Economics' analysis using the Labour Force Survey*

## A1.2   Supplementary results for Research Objective 4 (Section 0)

## A1.3   Results with those in full-time education excluded

| Table 55: The effect of entitlement to the adult rate on employment | | | | |
|---|---|---|---|---|
| **Treatment group 21 year olds; control group 20 year olds** | | | | |
| | (1)<br>All | (2)<br>Women | (3)<br>Men | (4)<br>Low-skilled |
| Impact of entitlement to the adult rate | 0.023*<br>(0.013) | 0.030*<br>(0.018) | 0.014<br>(0.019) | 0.008<br>(0.020) |
| *N* | 24,888 | 12,476 | 12,412 | 13,418 |
| **Treatment group 21 year olds; control group 22 year olds** | | | | |
| | (1)<br>All | (2)<br>Women | (3)<br>Men | (4)<br>Low-skilled |
| Impact of entitlement to the adult rate | -0.002<br>(0.012) | 0.015<br>(0.016) | -0.019<br>(0.017) | -0.021<br>(0.020) |
| *N* | 28,829 | 14,989 | 13,840 | 13,683 |

Note: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey.*

| Table 56: The effect of entitlement to the adult rate on unemployment | | | | |
|---|---|---|---|---|
| **Treatment group 21 year olds; control group 20 year olds** | | | | |
| | (1)<br>All | (2)<br>Women | (3)<br>Men | (4)<br>Low-skilled |
| Impact of entitlement to the adult rate | -0.006<br>(0.011) | -0.013<br>(0.014) | 0.004<br>(0.018) | 0.009<br>(0.017) |
| *N* | 24,888 | 12,476 | 12,412 | 13,418 |
| **Treatment group 21 year olds; control group 22 year olds** | | | | |
| | (1)<br>All | (2)<br>Women | (3)<br>Men | (4)<br>Low-skilled |
| Impact of entitlement to the adult rate | 0.020**<br>(0.010) | 0.002<br>(0.012) | 0.041***<br>(0.016) | 0.035**<br>(0.016) |
| *N* | 28,829 | 14,989 | 13,840 | 13,683 |

Note: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey.*

| Table 57: The effect of entitlement to the adult rate on inactivity | | | | |
|---|---|---|---|---|
| **Treatment group 21 year olds; control group 20 year olds** | | | | |
| | (1)<br>All | (2)<br>Women | (3)<br>Men | (4)<br>Low-skilled |
| Impact of entitlement to the adult rate | -0.016*<br>(0.010) | -0.016<br>(0.015) | -0.015<br>(0.011) | -0.015<br>(0.016) |
| *N* | 24,888 | 12,476 | 12,412 | 13,418 |
| **Treatment group 21 year olds; control group 22 year olds** | | | | |
| | (1)<br>All | (2)<br>Women | (3)<br>Men | (4)<br>Low-skilled |
| Impact of entitlement to the adult rate | -0.020**<br>(0.009) | -0.021<br>(0.014) | -0.023**<br>(0.010) | -0.019<br>(0.016) |
| *N* | 28,829 | 14,989 | 13,840 | 13,683 |

Note: Standard errors in parentheses; $^{*} p < 0.1$, $^{**} p < 0.05$, $^{***} p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey.*

## A1.3.1 Falsification tests for the impact on unemployment, inactivity and hours worked

| Table 58: Falsification tests for the impact on unemployment | | | | |
|---|---|---|---|---|
| **Treatment group 20 year olds; control group 19 year olds** | | | | |
| | (1)<br>All | (2)<br>Women | (3)<br>Men | (4)<br>Low-skilled |
| Impact of entitlement to the adult rate | 0.004<br>(0.010) | 0.009<br>(0.013) | -0.004<br>(0.016) | -0.005<br>(0.017) |
| N | 30,776 | 15,585 | 15,191 | 14,542 |
| **Treatment group 22 year olds; control group 23 year olds** | | | | |
| | (1)<br>All | (2)<br>Women | (3)<br>Men | (4)<br>Low-skilled |
| Impact of entitlement to the adult rate | 0.010<br>(0.008) | -0.006<br>(0.010) | 0.028**<br>(0.014) | 0.016<br>(0.014) |
| N | 35,195 | 18,645 | 16,550 | 14,489 |

Note: Standard errors in parentheses; $^{*} p < 0.1$, $^{**} p < 0.05$, $^{***} p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey.*

**Table 59: Falsification tests for the impact on inactivity**

| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
|---|---|---|---|---|
| **Treatment group 20 year olds; control group 19 year olds** | | | | |
| Impact of entitlement to the adult rate | -0.004 (0.008) | -0.002 (0.012) | -0.003 (0.009) | -0.018 (0.014) |
| N | 30,776 | 15,585 | 15,191 | 14,542 |
| **Treatment group 22 year olds; control group 23 year olds** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | -0.004 (0.008) | 0.001 (0.012) | -0.013 (0.009) | -0.001 (0.016) |
| N | 35,195 | 18,645 | 16,550 | 14,489 |

Note: Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey.*

**Table 60: Falsification tests for the impact on hours worked**

| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
|---|---|---|---|---|
| **Treatment group 20 year olds; control group 19 year olds** | | | | |
| Impact of entitlement to the adult rate | -0.011 (0.009) | -0.018 (0.013) | -0.004 (0.011) | 0.007 (0.013) |
| N | 20,626 | 10,500 | 10,045 | 8,056 |
| **Treatment group 22 year olds; control group 23 year olds** | | | | |
| | (1) All | (2) Women | (3) Men | (4) Low-skilled |
| Impact of entitlement to the adult rate | -0.005 (0.008) | -0.002 (0.013) | -0.005 (0.010) | -0.001 (0.014) |
| N | 25,356 | 13,006 | 12,350 | 8,521 |

Note: Standard errors in parentheses; $^*$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$
*Source: London Economics' analysis using the Labour Force Survey.*

## A1.4    Supplementary results relating to Research Objective 8

| Table 61: Determinants of the probability of being in FTE/Employment/NEET at the age of 17/18 | | | | | | |
|---|---|---|---|---|---|---|
| | FTE at 17 | FTE at 18 | Employed at 17 | Employed at 18 | NEET at 17 | NEET at 18 |
| Adult unemployment 2nd Quartile | 0.012 | 0.023 | -0.025 | -0.050* | 0.015 | 0.038* |
| | (0.026) | (0.031) | (0.021) | (0.029) | (0.014) | (0.021) |
| Adult unemployment 3th Quartile | 0.014 | 0.078** | -0.024 | -0.085*** | 0.017 | 0.018 |
| | (0.028) | (0.032) | (0.023) | (0.030) | (0.015) | (0.019) |
| Adult unemployment 4th Quartile | 0.010 | 0.105*** | -0.047** | -0.119*** | 0.033** | 0.024 |
| | (0.028) | (0.034) | (0.023) | (0.031) | (0.016) | (0.021) |
| (ln) Average wage distance from adult NMW | 0.072 | 0.174*** | -0.027 | -0.144*** | -0.033 | -0.025 |
| | (0.045) | (0.045) | (0.032) | (0.040) | (0.023) | (0.028) |
| At least one parent has GCSE or A-levels | 0.039 | 0.043 | 0.005 | 0.020 | -0.029* | -0.056*** |
| | (0.030) | (0.036) | (0.023) | (0.032) | (0.017) | (0.021) |
| At least one parent has Higher Education qualifications | 0.144*** | 0.164*** | -0.063*** | -0.047* | -0.051*** | -0.097*** |
| | (0.028) | (0.032) | (0.021) | (0.028) | (0.017) | (0.020) |
| Observations | 2,967 | 2,946 | 2,919 | 2,913 | 2,967 | 2,946 |

Note: The table reports the marginal effects of the probit regression. All regressions contain the full set of personal and family characteristics as well as time and regional dummies. The reference categories are: Adult Unemployment First Quartile, Youth Unemployment First Quartile, No qualifications or lower level qualifications. Adult: 25+; Youth: 16-24.
*Source: London Economics based on the Understanding Society and the BHPS*

| Table 62: Determinants of the probability of being in FTE/Employment/NEET at the age of 17/18 | | | | | | |
|---|---|---|---|---|---|---|
| | FTE at 17 | FTE at 18 | Employed at 17 | Employed at 18 | NEET at 17 | NEET at 18 |
| Youth unemployment 2nd Quartile | 0.041 | -0.010 | -0.010 | -0.022 | -0.024 | 0.032 |
| | (0.026) | (0.033) | (0.020) | (0.027) | (0.015) | (0.020) |
| Youth unemployment 3rd Quartile | 0.024 | 0.025 | -0.027 | -0.037 | 0.005 | 0.007 |
| | (0.025) | (0.034) | (0.020) | (0.029) | (0.017) | (0.020) |
| Youth unemployment 4th Quartile | 0.045 | 0.052 | -0.038* | -0.037 | -0.004 | -0.008 |
| | (0.027) | (0.034) | (0.023) | (0.028) | (0.017) | (0.020) |
| (ln) Average wage distance from youth NMW | 0.029* | 0.009 | -0.017 | -0.005 | -0.007 | -0.000 |
| | (0.017) | (0.019) | (0.013) | (0.015) | (0.011) | (0.014) |
| At least one parent has GCSE or A-levels | 0.040 | 0.036 | 0.005 | 0.029 | -0.029* | -0.059*** |
| | (0.030) | (0.036) | (0.023) | (0.033) | (0.017) | (0.022) |
| At least one parent has Higher Education qualifications | 0.146*** | 0.163*** | -0.062*** | -0.042 | -0.052*** | -0.101*** |
| | (0.028) | (0.031) | (0.021) | (0.028) | (0.017) | (0.021) |
| Observations | 2,947 | 2,917 | 2,900 | 2,884 | 2,947 | 2,917 |

Note: The table reports the marginal effects of the probit regression. All regressions contain the full set of personal and family characteristics as well as time and regional dummies. The reference categories are: Adult Unemployment First Quartile, Youth Unemployment First Quartile, No qualifications or lower level qualifications. Adult: 25+; Youth: 16-24.
*Source: London Economics based on the Understanding Society and the BHPS*

| Table 63: Determinants of the probability of being in FTE/Employment/NEET at the age of 17/18 conditional on being in FTE at t-1 | | | | | | |
|---|---|---|---|---|---|---|
| | **FTE at 17/ FTE at 16** | **FTE at 18/ FTE at 17** | **Employed at 17/ FTE at 16** | **Employed at 18/ FTE at 17** | **NEET at 17/ FTE at 16** | **NEET at 18/ FTE at 17** |
| Adult unemployment 2nd Quartile | 0.001 | 0.016 | 0.001 | -0.030 | -0.003 | -0.001 |
| | (0.033) | (0.044) | (0.024) | (0.040) | (0.021) | (0.018) |
| Adult unemployment 3th Quartile | -0.041 | 0.112** | 0.029 | -0.136*** | 0.000 | 0.018 |
| | (0.035) | (0.045) | (0.025) | (0.038) | (0.021) | (0.020) |
| Adult unemployment 4th Quartile | 0.044 | 0.077* | -0.044** | -0.105*** | 0.004 | 0.028 |
| | (0.032) | (0.046) | (0.022) | (0.039) | (0.022) | (0.021) |
| (ln) Average wage distance from adult NMW | 0.069 | 0.047 | -0.025 | -0.040 | -0.044 | -0.003 |
| | (0.048) | (0.055) | (0.035) | (0.046) | (0.028) | (0.028) |
| At least one parent has GCSE or A-levels | (0.036) | (0.041) | (0.025) | (0.034) | (0.022) | (0.023) |
| | 0.075** | 0.075* | -0.029 | -0.029 | -0.029 | -0.033 |
| At least one parent has Higher Education qualifications | (0.036) | (0.044) | (0.026) | (0.035) | (0.021) | (0.023) |
| | 0.089*** | 0.107*** | -0.036** | -0.051** | -0.033** | -0.037*** |
| Expecting to stay in education/FE | (0.022) | (0.028) | (0.018) | (0.022) | (0.013) | (0.014) |
| | (0.036) | (0.041) | (0.025) | (0.034) | (0.022) | (0.023) |
| Observations | 1,432 | 1,369 | 1,416 | 1,359 | 1,432 | 1,369 |

Note: The table reports the marginal effects of the probit regression. All regressions contain the full set of personal and family characteristics as well as time and regional dummies. The reference categories are: Adult Unemployment First Quartile, Youth Unemployment First Quartile, No qualifications or lower level qualifications. Adult: 25+; Youth: 16-24.
*Source: London Economics based on the Understanding Society and the BHPS*

| Table 64: Determinants of the probability of being in FTE/Employment/NEET at the age of 17/18 conditional on being in FTE at t-1 | | | | | | |
|---|---|---|---|---|---|---|
| | FTE at 17/ FTE at 16 | FTE at 18/ FTE at 17 | Employed at 17/ FTE at 16 | Employed at 18/ FTE at 17 | NEET at 17/ FTE at 16 | NEET at 18/ FTE at 17 |
| Youth unemployment 2nd Quartile | 0.015 | 0.061 | -0.023 | -0.048 | 0.009 | -0.014 |
| | (0.031) | (0.041) | (0.024) | (0.035) | (0.017) | (0.023) |
| Youth unemployment 3rd Quartile | 0.005 | 0.054 | 0.001 | -0.053 | -0.010 | -0.002 |
| | (0.032) | (0.040) | (0.025) | (0.034) | (0.016) | (0.024) |
| Youth unemployment 4th Quartile | -0.027 | 0.082** | 0.014 | -0.056 | 0.020 | -0.023 |
| | (0.034) | (0.041) | (0.028) | (0.037) | (0.018) | (0.023) |
| (ln) Average wage distance from youth NMW | 0.008 | 0.040* | -0.036** | -0.039 | 0.020 | 0.004 |
| | (0.023) | (0.023) | (0.017) | (0.024) | (0.015) | (0.015) |
| At least one parent has GCSE or A-levels | -0.009 | 0.028 | 0.020 | 0.007 | -0.000 | -0.034 |
| | (0.036) | (0.041) | (0.026) | (0.034) | (0.021) | (0.023) |
| At least one parent has Higher Education qualifications | 0.080** | 0.075* | -0.034 | -0.025 | -0.029 | -0.039* |
| | (0.036) | (0.043) | (0.026) | (0.035) | (0.021) | (0.023) |
| Expecting to stay in education/FE | 0.093*** | 0.102*** | -0.038** | -0.048** | -0.033** | -0.036*** |
| | (0.022) | (0.027) | (0.017) | (0.022) | (0.013) | (0.014) |
| Observations | 1,424 | 1,359 | 1,408 | 1,349 | 1,424 | 1,359 |

Note: The table reports the marginal effects of the probit regression. All regressions contain the full set of personal and family characteristics as well as time and regional dummies. The reference categories are: Adult Unemployment First Quartile, Youth Unemployment First Quartile, No qualifications or lower level qualifications. Adult: 25+; Youth: 16-24.
*Source: London Economics based on the Understanding Society and the BHPS*