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The wage scar from male youth unemployment

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Abstract

We utilise the National Child Development Survey to analyse the impact of youth unemployment upon the wage up to twenty years later. We find a large and significant wage penalty, even after controlling for education, region and a wealth of family and individual characteristics. Our estimates are robust to an instrumental variables technique, indicating that the relationship estimated between youth unemployment and the wage is causal. Our results suggest a scar from early unemployment in the magnitude of 13–21% at age 42. However, this penalty is lower, at 9–11%, if individuals avoid repeat exposure to unemployment.
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1. Introduction

Whilst a spell of unemployment will generate a direct loss of income, studies examining the full cost of job loss show that a period of unemployment disadvantages individuals above and beyond this direct cost. For example, Jacobson et al. (1993) provide evidence of a wage loss associated with displacement from employment which starts prior to the date of displacement and is still evident five years following. Furthermore, according to Stevens (1997), in the post-displacement period a person is made much more

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vulnerable to repeated incidence of unemployment. This combined with evidence of a widening gap between pre- and post-displacement wages in the UK (Nickell et al., 2002) suggests long lasting negative effects from a spell of unemployment. The deterioration of labour market prospects stemming directly from an initial spell of unemployment is often termed a 'scar'.

However, an econometric problem exists whereby the fixed individual characteristics, which make someone prone to unemployment as a youth, may also drive later unemployment and poor wages. Further, these characteristics may well be poorly observed in conventional databases or difficult to observe at all, such as motivation, self-confidence and expectations. Consequently, the relationship between early unemployment and later outcomes may not be causal but reflect heterogeneity. If this is the case, policy aimed at reducing the incidence or duration of unemployment will be misdirected.

We use the National Child Development Survey (NCDS) to explore evidence of scarring in the form of persistently lower wages from a person's youth unemployment experience. We look at how these scars evolve in terms of the initial impact on wages and subsequent recovery and the countervailing impact of repeat incidence of job loss from entry into the labour market up to age 42. For reasons of brevity, here we only explore patterns for men here but the results of women are available in Gregg and Tominey (2003). The NCDS has an expanse of information on individual heterogeneity often unobservable in data, such as the cohort members ability (literacy, numeracy and intelligence tests) and detailed family background, as well as information on their educational, occupational and economic achievements during their lifetime. However if unobservable characteristics of cohort members drive early unemployment experiences and the later wages, our results will still be biased. Therefore to ensure the estimated relationship is truly causal we employ the Instrumental Variables technique. The unemployment rate prevalent locally for individuals aged 16 is used to instrument youth unemployment in the wage equation for individuals aged 33. The intuition is that at such a young age, the individuals have little autonomy over their area of residence, thus the personal characteristics of the individuals are removed from the equation. Further, the local rate of unemployment certainly plays a key role in determining experiences of youth unemployment. We conclude that unobserved heterogeneity does not create a bias.

We conclude that youth unemployment does indeed impose a wage scar upon individuals, in the magnitude of 13–21% for a year of youth unemployment, at age 42. However, this penalty is lower, at 9–11%, if individuals avoid repeat incidence of unemployment. The structure of the paper is as follows. The literature surrounding this topic is evaluated in Section 2. Section 3 details the dataset and the methodology adopted is described in Section 4. The results are analysed in Section 5 with relevant tables and Section 6 concludes and discusses the scope for future policy based upon these results.

2. Existing literature

The literature on the effects from scarring highlights a twofold impact; damage to future employment prospects and lowering subsequent earnings; effects which potentially may last for the individual's entire remaining working lifetime.

A number of economic theories predict scarring. Following the intuition of Becker (1975), although general skills raise a worker's marginal productivity in all different firms and sectors, firm specific skills are non-transferable and thus increase the worker's marginal productivity only in the firm providing the investment. A consequence of unemployment is the depreciation of general skills and the loss of firm specific skills. The worker will therefore receive a wage lower on return to the labour market than that received prior to the spell of unemployment. However, re-entry into the labour market will initiate further accumulation of human capital and hence, as long as there are diminishing returns to extra tenure, the scarring effects will only be temporary.

Pissarides (1994) extends standard search theories to include on-the-job search. With dispersion in firm productivity, low quality firms recruit unemployed but lose them to better, higher paying productivity firms. Displacement from a good job means a high probability of return to a lower quality one and hence a cost-of-job loss. The recent upsurge in interest in modern or dynamic monopsony theory for the labour market (see Manning, 2003) would go further suggesting that a job-shopping model predicts that "a lifetime career then comes to resemble a game of snakes and ladders" (Manning, 2003, p152), whereby on-the-job search presents a ladder to move to better paid jobs whilst job loss sends a person down a snake to a lower paid position. Crucially here, these theoretical explanations suggests that the costs of job loss are not solely due to human capital loses and that a scar effect can be repeated and indeed a first separation could raise the likelihood of further incidence of job loss.

Over the past decade, empirical economic studies have sought identification of the scarring effect from unemployment by observing wages in the periods preceding and following the spell for workers, where the displacement can be reasonably thought to be exogenous to their quality. Rhum (1991) compares a control group of nondisplaced workers to a group of displaced workers in the three years prior to displacement and four years following. He found significant negative long-term effects on wages and unemployment duration from periods spent unemployed. Using administrative records from Pennsylvania, Jacobson et al. (1993) detect an earnings loss three years prior to displacement. At the date of displacement there will be a dramatic drop in earnings, followed by a recovery. Even after 5 years displaced workers tend to have 25% lower earnings than non-displaced workers. The UK literature explores the effects of unemployment more generally rather than focusing on displaced workers, with similar findings.[1]

Looking in particular at the scar imposed upon an individual from youth unemployment, Gregory and Jukes (2001) explore variation across age groups and suggest the impact effect of unemployment is more marked with older workers, but duration effects are more substantial for the young. Gregg (2001) uses NCDS to analyse scarring in terms of future employment prospects. Specifically Gregg suggests that the cumulated unemployment experience up to the age of 23 drives unemployment in subsequent years. In addition, an instrumental variables technique is used to suggest that this relationship is causal.

A general consensus between these authors is that an unemployment spell consistently imposes a persistent wage scar upon individuals. However, these studies rarely follow

[1] See for example Nickell et al. (2002), Arulampalam (2001), Borland et al. (2002).

individuals for more than 5 years. Stevens (1997) suggests that a substantial factor of the persistent effect is from repeat incidence, which inhibits wage recovery and Gregg (2001) suggests that a spell of unemployment causally increases the likelihood of experiencing further unemployment. This present paper is closest in spirit to Stevens (1997). We use the NCDS to track the impact of youth unemployment upon earnings up to age 42. We explore how such penalties diminish over that period and the role for further unemployment in preventing recovery.

3. Data set

To show the impact that youth unemployment has upon an individual's future experience in the labour market, we utilise the National Child Development Survey (NCDS), a longitudinal birth cohort panel. The NCDS children were those born in Great Britain in the week 3–9 March, 1958. The common birth date of the cohort means that the sample are all the same age when any aggregate macroeconomic shocks occur. Subsequently, information has been collected on these cohorts at ages 7, 11, 16, 23, 33 and 42.

During the survey, information was gathered not only from the individuals themselves. The parents were interviewed on topics such as their smoking, working, personal relationships, levels of financial difficulty and the child's mental and physical health. Further, the child's ability was observed through a number of tests administered to the children, including reading, comprehension, mathematics and non-verbal reasoning (akin to IQ). Details for the cohort members as adults were collected at ages 23, 33 and 42 which included their wages and educational and employment histories. These data have been converted from spell data to a monthly record of status by the management team charged with the development of this data source. If spell dates overlap for a month, employment spells overwrite unemployment and unemployment dominates inactivity. So if a month record suggests two weeks was spent in employment and two weeks unemployed, the monthly record will show the person as being employed. Hence short spells of unemployment will be under-recorded in the data. Unemployment is self-defined by the cohort member. If a person is recorded as in full-time education in any month then this data point is ignored for purposes of calculating months spent in employment or unemployment.

4. Methodology

Our interest lies in the extent to which youth unemployment scars an individual in terms of their subsequent wages. Youth unemployment is defined as the cumulative months of unemployment covering the ages 16–23. Individuals pursuing further education into their twenties will not provide a representative picture of youth experience in the labour market, thus the sample is limited to individuals with an employment history lasting more than 24 months between age 16 and 23. This data requirement results in dropping 365 cases who are predominantly degree students. Nearly all these cases have details of

fewer than 18 months in their employment history outside full-time education. This sample requirement does not greatly affect the pattern of the final results.

We attempt to identify the non-linear relationship between youth unemployment and the subsequent wage, grouping the youth unemployment experience into six categories: zero months, 1–2 months, 3–4 months, 5–6 months, 7–12 months and 13+ months. We analyse the wage scar for those with youth unemployment relative to the counterfactual group experiencing no youth unemployment. The dependent variable of the tests is the natural log of the wage. The analysis of the wage scar at each stage requires a sample constraint, including only those reporting a wage at the relevant age.[2] This raises sample selection issues especially as those not reporting wage at a certain date are those likely to have had a large amount of time in unemployment. To address this issue we use the fact that we do observe wages at other points in time for most cohort members to bound our estimates.

The data from NCDS is combined with information ward level unemployment rates from Census data in 1971 and 1991, for the purpose of employing the Instrumental Variables technique to test for potential heterogeneity manifested in the data.

4.1. Heterogeneity

Any unobserved heterogeneity that is correlated with both unemployment and wages will create an upward bias to the estimates of the impact of preceding unemployment.

Formally, individual i's wage experience at time t ($W_{i,t}$) is a function of their unemployment experience up to the age of 23 ($U_{i,t-1}$), heterogeneity ($Z_{i,t}$) and an error term (E_{it}).

$$W_{i,t} = \beta' U_{i,t-1} + \delta' Z_{i,t} + E_{i,t} \tag{1}$$

Heterogeneity comprises of a set of non-time varying observable characteristics of the individual i (A_i) including gender, family background and child ability and unobservable characteristics (B_i), which may capture expectations, aspirations or self-confidence, and an error term (ξ_{it}).

$$Z_{i,t} = \gamma' A_i + \eta' B_i + \xi_{i,t} \tag{2}$$

The consequence of failure to take account of heterogeneity is the false conclusion of a strong relationship between unemployment and subsequent wages when it is not the unemployment per se that results in lower wages, but the unobserved heterogeneity. This will result in either an omitted variable bias, or a violation of the OLS assumption that the coefficient $U_{i,t-1}$ is uncorrelated with the error term. Therefore the assessment of the wage scar created from youth unemployment is a two-stage task: first, identify the relationship between youth unemployment and the individual's subsequent wage. Second, examine whether this relationship is causal.

[2] A summary of characteristics for individuals reporting a wage at different periods of observation is given in Appendix A.1.

4.2. Controlling for heterogeneity

4.2.1. Utilising NCDS

The plethora of information contained in NCDS is an advantage in the task of isolating a causal relationship between youth unemployment and the subseque nt wage. The cohort members were born in the same week and therefore age is not included as an explanatory variable of the model. The benefit of NCDS is the information on variables that are often unobservable, such as school attendance, ability (through a range of literacy, numeracy and cognitive test scores) and childhood deprivation. These variables certainly have the potential to influence the individual's experience within the labour market later in life. Following Gregg (2001), we define a group of variables specific to the individual's family background and a group of variables pertinent to the individual, including their test scores as school pupils.[3] If the individual and family specific characteristics are creating an omitted variable bias in the relationship between youth unemployment and subsequent wages, the coefficient of unemployment will fall with the introduction of these background variables. In addition we also condition of the initial job match characteristics (industry and occupation) which may reflect heterogeneity observable to employers but unobservable to researchers.

4.2.2. Econometric techniques

However detailed the set of child and family information available, one or more important background characteristic may have been excluded from the dataset or badly measured. Therefore we adopt an Instrumental Variables (IV) technique to further control for the unobserved heterogeneity.

For the IV method it is necessary to identify a variable which drives the unemployment experience—the endogenous variable—but which is exogenous to the individual. This will ensure that any results we observe for the relationship between unemployment and the wage is causal. A criticism of the IV technique is the difficulty in identifying an instrument strongly correlated with the input. With the nature and expanse of the longitudinal NCDS data, identifying an instrument is simplified. With impetus from Gregg (2001), the unemployment rate prevalent locally for individuals aged 16 is employed to instrument youth unemployment in the wage equation for individuals aged 33. The intuition is that at such a young age, the individuals have little autonomy over their area of residence, thus the personal characteristics of the individuals are removed from the equation. Further, the local rate of unemployment certainly plays a role in determining experiences of unemployment. The IV approach is discussed fully in the next section.

5. Results

5.1. Summary of NCDS data

Table 1 describes the characteristics of the males in the NCDS dataset. The cohort members have been grouped into six categories, depending upon the number of months

[3] Appendix A.2. details the family and individual specific characteristics.

Table 1
Summary of NCDS Sample

Youth Unemployment 16–23	I	II	III	IV	V	VI	VII	VIII
	No. Indivds	% of Sample	Average Months Youth Unemployment 16–23	Mean Pay at 23 £ per hour (2000 prices)	Average Months Unemployment 23–33	Mean Pay at 33 £ per hour (2000 prices)	Average Months Unemployment 33–42	Mean Pay at 42 £ per hour (2000 prices)
Men								
0 months	2607	58.6	0	6.400	1.450	10.500	1.160	12.386
1–2 months	539	12.1	1.430	6.190	3.023	9.823	1.581	12.195
3–4 months	364	8.2	3.374	5.938	2.984	9.649	3.280	11.728
5–6 months	231	5.2	5.472	5.660	4.627	9.045	1.814	11.778
7–12 months	342	7.7	9.190	5.553	7.285	8.090	4.368	9.989
13+ months	366	8.2	25.680	4.726	21.745	7.132	10.150	8.461
Total	**4449**	100						

spent unemployed between the age of 16–23: zero months, 1–2 months, 3–4 months, 5–6 months, 7–12 months and 13+ months. Approximately 60% of individuals experience no unemployment during their youth and 12% reported just 1 or 2 months. However, one fifth of the sample individuals are subjected to 5+ months of unemployment during their youth, with the hardest hit 8% clocking up some 26 months unemployment as youths on average. There is an easily identifiable correlation between unemployment during youth and in the subsequent decade (column V), although between ages 33–42 (column VII) even the individuals with extensive youth unemployment are rarely unemployed. This may, in part, reflect the fact that the period of 1991 to 2000 was characterised by a sustained upswing.

Immediately obvious from columns IV, VI and VIII is the trend for a lower mean wage for members of the cohort with more extensive youth unemployment. Men carrying the worst history from their youth labour market experience will be paid £4.00 per hour less twenty years later, a 30% penalty, compared to men with no youth unemployment. The wage gap is large whether the wage is measured at age 23, 33 or 42.

5.2. Wages at 23

Table 2 reports the wage scar at 23 for men. Cohort members are included in the analysis only if they report a wage at 23; details of the restricted sample are given beneath the regression results. Almost 1,000 men have been dropped from the sample, changing the composition so that individuals with no history of youth unemployment have a somewhat greater representation and those with 13+ months have almost half as much prevalence than in the whole sample (see lower panel).

Looking at column I, a large raw wage gap at 23 is evident between those experiencing 5+ months of unemployment compared to those with no or very little youth unemployment. Compared to an individual with no youth unemployment, a history of 13+ months of unemployment between the ages of 16 and 23 is associated with a 30% average reduction in earnings of at age 23.

Introducing controls for background characteristics in turn will identify the contribution of each towards the wage gap at 23. By age 23, the returns to educational qualifications are not yet fully apparent. Men with higher vocational qualifications or above are earning only between 13–18% more than those with no qualifications. So Column II of Table 2 shows youth unemployment on the whole to be less severe once education is taken into account, but not by very much. The implied effect of 7+ months unemployment on wages is a reduction of the scar by just 3–5%.

Whilst educational returns are low at age 23, it may be that other factors, correlated with youth unemployment, are driving the observed variation in wages. The most obvious candidates are ability unmeasured by qualifications and dimensions of parental background. The NCDS unusually allows a serious attempt to control for many of these characteristics. Column III of Table 2 reports that inclusion of a wealth of detail capturing the family and individual heterogeneity does little to alter the wage scar reported above.

Finally, initial sorting in the labour market prior to the onset of unemployment may explain wage variations and be correlated to subsequent unemployment exposure. The quality of the initial job match may reflect heterogeneity observable by the employer but unobserved by the researcher and furthermore anticipate future career progression. So

Table 2
Dependent Variable is Log Wage Penalty aged 23 for Males

Youth Unemployment	I	II	III	IV
	Log Wage Penalty			
1–2 Months	−0.033 (0.020)	−0.021 (0.020)	−0.016 (0.020)	−0.011 (0.020)
3–4 Months	−0.055 (0.025)**	−0.041 (0.024)*	−0.042 (0.025)*	−0.031 (0.024)
5–6 Months	−0.126 (0.031)**	−0.112 (0.031)**	−0.105 (0.031)**	−0.095 (0.031)**
7–12 Months	−0.131 (0.029)**	−0.100 (0.028)**	−0.100 (0.029)**	−0.091 (0.028)**
13+ Months	−0.296 (0.034)**	−0.242 (0.034)**	−0.232 (0.034)**	−0.207 (0.034)**
Education Variables				
Lower vocational Qualifications		0.100 (0.063)	0.107 (0.063)*	0.103 (0.062)*
Lower academic		0.035 (0.049)	0.023 (0.049)	0.044 (0.048)
Intermediate Vocational		0.095 (0.045)**	0.080 (0.045)*	0.062 (0.045)
O'Level or equivalent		0.104 (0.019)**	0.091 (0.021)**	0.066 (0.021)**
Higher Vocational		0.153 (0.021)**	0.139 (0.023)**	0.108 (0.023)**
A'Level or equivalent		0.174 (0.031)**	0.154 (0.034)**	0.120 (0.034)**
Level 5 vocational		0.178 (0.026)**	0.161 (0.028)**	0.124 (0.028)**
Degree or equivalent		0.126 (0.025)**	0.105 (0.030)**	0.077 (0.032)**
Controls				
Regional Variables aged 23[a]	No	Yes	Yes	Yes
Family and Individual Variables	No	No	Yes	Yes
Occupation and Industry	No	No	No	Yes

NCDS Sample: Conditional upon reporting wage at 23

Youth Unemployment	No. Individs	% of Sample	Mean Pay at 23 £ per hour (2000 prices)	Average Months Youth Unemployment
Males				
0 Months	2263		6.400	0
1–2 Months	449		6.190	1.425
3–4 Months	286		5.940	3.392
5–6 Months	169		5.660	5.420
7–12 Months	207		5.553	9.048
13+ Months	146		4.726	23.274
Total	**3520**			

Simulation of Wage penalty allowing for Sample Selection for aged 23 for Males

Youth Unemployment	I	II	III
	Log Wage Penalty		
1–2 Months	−0.038	−0.027	−0.021
3–4 Months	−0.065	−0.051	−0.039
5–6 Months	−0.143	−0.129	−0.117
7–12 Months	−0.130	−0.099	−0.090
13+ Months	−0.296	−0.244	−0.214
Controls			
Regional Variables aged 23	No	Yes	Yes
Family and Individual Variables	No	No	Yes
Occupation and Industry	No	No	Yes

Sample size: 4081.
[a] See Appendix A.3. and A.4. for full regression results.

Column IV includes broad industry and occupation dummies for the initial entry job taken. The estimated unemployment effects are reduced very modestly by the inclusion of initial job match characteristics and this stems entirely from industry controls.

5.2.1. Sample selection

As noted above the requirement of observing a current wage loses almost 1,000 observations. These missing people are not necessarily randomly drawn from the population. Indeed this was the height of the 1981 recession and a time of very high worklessnesss among youth. Their exclusion may thus create a bias to our estimates of the impact of unemployment. For about three quarters of this missing group we can observe a wage at age 33 however. So for those we observe a wage for at 23 we are estimating

$$\mathrm{W}_{\mathrm{i,t=23}} = \beta' \mathrm{U}_{\mathrm{i,t<23}} + \phi' \mathrm{X}_{\mathrm{i,t=23}} + \varepsilon_{\mathrm{i,t=23}} \text{ if Wage is observed}$$

where the error term has mean zero. We can think of the true unobserved wages of those not reporting a wage as being:

$$\mathrm{W}_{\mathrm{i,t=23}} = \beta' \mathrm{U}_{\mathrm{i,t<23}} + \phi' \mathrm{X}_{\mathrm{i,t=23}} + \kappa_{\mathrm{i,t=23}} \text{ if Wage is unobserved}$$

That is it is the wage predicted by the individuals observed characteristics according to estimated coefficients from those who have an observed wage plus an individual error term. If we make no adjustment for sample selection we are implicitly assuming that this error term, $\kappa_{\mathrm{i,t=23}}$, is mean zero and that our estimates are unbiased. However, as we observe their wages at age 33, we can make an alternative assumption that the unobserved $\kappa_{\mathrm{i,t=23}}$ takes the same value as the error term from the wage equation at age 33 for the same individual. So

$$\mathrm{W}_{\mathrm{i,t=33}} = \beta' U_{\mathrm{i,t<23}} + \phi' X_{\mathrm{i,t=33}} + \varepsilon_{\mathrm{i,t=33}} \text{ if Wage is observed at 33}$$

and assume that

$$\kappa_{\mathrm{i,t=23}} = \varepsilon_{\mathrm{i,t=33}}$$

for each individual for whom the wage is observed at 33 but not at age 23. As this assumes reversion to the mean it can be thought of as giving a reasonable estimate of an upper bound. The lower panel of Table 2 reports the implication of undertaking a simulation on the basis described above. In comparing the upper and lower panels we see the impact on wages at age 23 of youth unemployment is relatively modest. So although we have many individuals with a large amount of youth unemployment who don't report a wage their simulated wage does not deviate substantially from that predicted by their observed characteristics.

5.3. Wages at 33

The next stage of analysis steps ten years further into the individuals lives, looking for evidence of the wage scar at age 33. Table 3a detail these results. Hence it is necessary to restrict the sample of evaluation to those reporting a wage at 33. The restriction excludes approximately 1,200 cohort members from the full sample.

By age 33, the raw log wage penalty for males at every category of youth unemployment, reported in column I, has intensified relative to a fully employed person

Table 3a
Dependent Variable is Log Wage Penalty aged 33 for Males

Youth Unemployment	I	II	III	IV
	Log Wage Penalty			
1–2 Months	−0.075 (0.024)**	−0.030 (0.021)	−0.024 (0.021)	−0.011 (0.021)
3–4 Months	−0.098 (0.029)**	−0.089 (0.025)**	−0.085 (0.025)**	−0.067 (0.025)**
5–6 Months	−0.136 (0.035)**	−0.113 (0.031)**	−0.104 (0.030)**	−0.071 (0.030)**
7–12 Months	−0.252 (0.030)**	−0.160 (0.027)**	−0.144 (0.026)**	−0.109 (0.028)**
13+ Months	−0.424 (0.030)**	−0.252 (0.027)**	−0.222 (0.027)**	−0.149 (0.032)**
Education Variables				
Lower vocational qualifications		0.231 (0.060)**	0.199 (0.058)**	0.183 (0.057)**
Lower academic		0.117 (0.051)**	0.089 (0.050)*	0.086 (0.049)*
Intermediate Vocational		0.160 (0.051)**	0.113 (0.050)**	0.104 (0.049)**
O'Level or equivalent		0.227 (0.020)**	0.130 (0.021)**	0.123 (0.021)**
Higher Vocational		0.277 (0.023)**	0.185 (0.024)**	0.171 (0.024)**
A'Level or equivalent		0.489 (0.031)**	0.300 (0.034)**	0.283 (0.034)**
Level 5 vocational		0.448 (0.027)**	0.293 (0.029)**	0.273 (0.028)**
Degree or equivalent		0.603 (0.025)**	0.380 (0.031)**	0.369 (0.032)**
Unemployment 23–33				
1–2 Months				−0.033 (0.036)
3–4 Months				−0.160 (0.042)**
5–6 Months				−0.197 (0.049)**
7–12 Months				−0.176 (0.038)**
13+ Months				−0.320 (0.031)**
LT Youth + 23–33 Unemployment				0.055 (0.042)
Controls				
Regional Variables aged 23	No	Yes	Yes	Yes
Family and Individual Variables	No	No	Yes	Yes
Occupation and Industry	No	No	Yes	Yes

NCDS Sample of Males: Conditional upon reporting wage at 33

Youth Unemployment	No. Individs	Average Months Youth Unemployment	Mean Pay at 33 £ per hour (2000 prices)	Average Unemployment 23–33
Males				
0 Months	1924	0	10.500	1.413
1–2 Months	400	1.430	9.823	2.865
3–4 Months	267	3.371	9.649	3.187
5–6 Months	172	5.459	9.045	4.430
7–12 Months	240	9.217	8.100	7.225
13+ Months	245	25.233	7.132	18.775
Total	**3248**			

(continued on next page)

Table 3a (*continued*)

Simulation of Wage penalty allowing for Sample Selection for males aged 33				
Youth Unemployment	I	II	III	IV
	Log Wage Penalty			
Youth Unemployment	*Log Wage Penalty*			
1–2 Months	−0.071	−0.026	−0.026	−0.014
3–4 Months	−0.100	−0.091	−0.087	−0.061
5–6 Months	−0.140	−0.119	−0.123	−0.088
7–12 Months	−0.292	−0.200	−0.187	−0.133
13+ Months	−0.502	−0.330	−0.313	−0.197
Controls				
Regional Variables aged 23	No	Yes	Yes	Yes
Family and Individual Variables	No	No	Yes	Yes
Occupation and Industry	No	No	Yes	Yes
Unemployment 23–33	No	No	No	Yes

Sample size: 4449.

prior to age 23. Focusing upon the worst-case scenario, for a male reporting a history of 13+ months of youth unemployment, over the years 23–33 the wage penalty has increased by 12%, to 42%. Conditioning upon educational achievement becomes much more important, as returns to education have risen with age. The results in column II show that the wages of men with over a year worth of youth unemployment are lower by up to 25% at 33 compared to the individual with no youth unemployment. Column III displays results when controlling for family and individual specific characteristics and occupation and industry of the initial entry job. The conditional estimates of the wage penalty associated with youth unemployment are now very similar at ages 23 and 33. This suggests little or no progress in mitigating the impact of youth unemployment over the decade.

Column IV of Table 3a introduce controls for unemployment experience between the ages of 23–33. This conditions out the extent to which youth unemployment experience is correlated with later unemployment experience. It also includes an interaction term for those experiencing 7+ months unemployment before age 23 and 3+ months between ages 23 and 33. This allows repeat displacement to weaker wage penalties than the first displacement. The males within our sample experiencing 3–6 months unemployment as youths but no extra unemployment after age 23 now have wage penalties in the order of 7%. For 7+ months the penalty increases to 11% and for 13+ months 15%. There is then evidence of earnings recovery among those experiencing substantial youth unemployment, if they avoid further exposure to unemployment. However, those with extensive unemployment during both periods suffer very large wage penalties. The interaction term for those experiencing substantive unemployment in both periods is positive but insignificant.

This finding of large wage penalties for unemployment between ages 23 and 33 raises a question about when the wage difference is first evident. If lower ability or motivation is observed by employers but not picked up in the data, then the wage at 23 may be lower for individuals who go on to experience extensive later unemployment. We separate

individuals experiencing at least 6 months of youth unemployment by 23 into two groups: those fully employed in the following decade and those with some unemployment (at least 3 months). There was no significant difference in the wage at 23 for the two groups of individuals.[4] This suggests that it is the later unemployment experience that induces the wage penalty at 33, rather than lower ability, unobserved by the researcher but apparent to employers (and reflected in the wage) at age 23.

5.3.1. Selection

Once again there is the issue of sample selection. Those not reporting a wage at 33 may well not be randomly drawn from the wage distribution for given characteristics. As before we can explore this by looking at whether those not reporting a wage at age 33 had unusually low wages when we can observe them at age 23. So again we simulate a wage for this group by predicting a wage based on their characteristics at age 33 (using the coefficients from the regressions reported in the upper panel Table 3a) but add on a term based on the residuals for these individuals in the age 23 equation. These are shown in the lower panel of Table 3a and suggest that their omission is underestimating the wage scar at age 33. In columns I–III the bias is such that the penalty rises by around 9%, however, once unemployment experience is conditioned on (Column IV) this is reduced to 5%.

This suggests that the earnings recovery is more muted once we allow for sample selection, but of course this simulation assumes no reversion to the mean and is thus an upper bound.[5]

Another way of looking the effect of differential sample selection at ages 23 and 33 is to explore the dynamics of the wage penalty between ages 23 and 33. This requires both wages at 23 and 33 to be observed but it is a balanced panel. Column I of Table 3b shows the correlations between wage growth and male youth unemployment conditioning as before. The results match implications of the above results that there is no significant catch-up for individuals with a substantial amount of youth unemployment. Column II controls for repeat unemployment between the age of 23 and 33 and suggests that there is wage recovery among men experiencing over a year of youth unemployment. Pooling those with 5+ months unemployment improves the precision of the estimates and suggests a modest recovery of around 5% for those who go on to experience no further unemployment. All the results point to the conclusion of a modest earnings recovery for those who have experienced a lot of unemployment prior to age 23, if and only if the avoid further unemployment. Those getting hit again, a common occurrence, suffer very large wage penalties by age 33.

5.3.2. Education and scarring

Those youths securing better qualifications on leaving full-time education are less prone to youth unemployment but two further questions remain about how education and scarring relate. First, are those well educated youths who do experience youth unemployment subject to the same degree of wage reductions and second is there evidence of beneficial effects from

[4] Coefficient for men with youth unemployment and some later unemployment was 0.0426 (0.0476).

[5] A simple verification of this bias is to include a dummy in the wage 23 equation for where the age 33 wage is missing. Adding such a term to Column III of Table 2 results in a coefficient of −0.069 (0.015).

Table 3b
Dependent Variable is Wage Growth between ages 23–33

	I	II	III
	Wage Growth		
Youth Unemployment			
1–2 Months	0.018 (0.026)	0.026 (0.026)	0.031 (0.026)
3–4 Months	−0.027 (0.032)	−0.010 (0.032)	−0.011 (0.032)
5–6 Months	0.032 (0.041)	0.050 (0.040)	0.051 (0.040)
7–12 Months	−0.045 (0.038)	−0.002 (0.040)	−0.008 (0.040)
13+ Months	0.038 (0.044)	0.097 (0.048)**	0.095 (0.047)**
Unemployment 23–33			
1–2 Months		0.043 (0.048)	0.038 (0.048)
3–4 Months		−0.144 (0.059)**	−0.151 (0.059)**
5–6 Months		0.044 (0.067)	0.040 (0.067)
7–12 Months		−0.137 (0.053)**	−0.134 (0.053)**
13+ Months		−0.244 (0.044)**	−0.244 (0.044)**
LT Youth+23–33 Unemployment		−0.087 (0.069)	−0.084 (0.069)
Educational Upgrade			0.103 (0.023)**
Controls			
Education Variables	Yes	Yes	Yes
Regional Variables aged 23	Yes	Yes	Yes
Family and Individual Variables	Yes	Yes	Yes
Occupation and Industry	Yes	Yes	Yes

educational upgrading by those who experience youth unemployment. To test the first question we interact experiencing 5+ months unemployment before age 23 with having O level or higher qualifications. At age 23 this interaction term is −0.086(0.046) at 23, −0.008(0.040) at 33 and −0.096(0.056) at 42, suggesting that those well educated persons experiencing substantial unemployment are more severely damaged in their earnings and have no substantial additional recovery of earnings. So whilst education reduces the incidence of exposure to unemployment it does not reduce the wage scar or promote recovery.

Gregg and Machin (2000) found that there are significant wage returns from late achievement of educational qualifications. Some 18% of males in our sample improve their educational achievement between 23–33 and columns III of Table 3b shows that a wage improvement of 11% for men attributed to late educational development. However, further investigation suggests that such upgrading is not more common among those experiencing a lot of youth unemployment or more beneficial. This suggests that education can help youths recover from early unemployment but it is not commonly undertaken.

5.4. The wage scar at 42

More than twenty years after an event of unemployment has occurred, does the negative impact remain? Table 4a report the results for wages at age 42 and compared to the penalty prevailing at age 33, the raw wage penalty from youth unemployment has weakened. Here 13+ months of youth unemployment was associated with a raw wage gap of approximately 30% at age 23, which increases to 42% by age 33 and falls back to 32%

Table 4a
Dependent Variable is Log Wage at age 42 for Males

Youth Unemployment	I	II	III	IV
	Log Wage Penalty			
1–2 Months	−0.076 (0.031)**	−0.041 (0.028)	−0.033 (0.028)	−0.020 (0.027)
3–4 Months	−0.046 (0.037)	−0.055 (0.034)*	−0.036 (0.033)	−0.005 (0.033)
5–6 Months	−0.038 (0.046)	−0.020 (0.042)	0.006 (0.041)	0.027 (0.041)
7–12 Months	−0.184 (0.038)**	−0.125 (0.035)**	−0.097 (0.034)**	−0.076 (0.038)**
13+ Months	−0.315 (0.041)**	−0.182 (0.038)**	−0.127 (0.038)**	−0.105 (0.044)**
Education Variables				
Lower vocational qualifications		0.171 (0.084)**	0.125 (0.082)	0.119 (0.081)
Lower academic		0.124 (0.070)*	0.097 (0.069)	0.108 (0.068)
Intermediate Vocational		0.071 (0.065)	0.044 (0.064)	0.056 (0.063)
O'Level or equivalent		0.230 (0.027)**	0.133 (0.029)**	0.172 (0.027)**
Higher Vocational		0.280 (0.030)**	0.185 (0.032)**	0.225 (0.030)**
A'Level or equivalent		0.572 (0.041)**	0.375 (0.045)**	0.433 (0.041)**
Level 5 vocational		0.404 (0.036)**	0.241 (0.039)**	0.281 (0.036)**
Degree or equivalent		0.644 (0.033)**	0.403 (0.041)**	0.471 (0.036)**
Unemployment 23–33				
1–2 Months				0.044 (0.048)
3–4 Months				−0.132 (0.056)**
5–6 Months				−0.116 (0.064)*
7–12 Months				−0.161 (0.053)**
13+ Months				−0.190 (0.044)**
Unemployment 33–42				
1–2 Months				−0.050 (0.065)
3–4 Months				−0.141 (0.060)**
5–6 Months				−0.088 (0.068)
7–12 Months				−0.210 (0.060)**
13+ Months				−0.303 (0.058)**
LT Youth+23–33 Unemployment				0.094 (0.059)
LT Youth+33–42 Unemployment				0.047 (0.071)
Controls				
Regional Variables aged 23	No	Yes	Yes	Yes
Family and Individual Variables	No	No	Yes	Yes
Occupation and Industry	No	No	Yes	Yes

NCDS Sample: Conditional upon reporting wage at 42

Youth Unemployment	No. Individs	Average MonthsYouth Unemployment	Average Months Unemployment 23–33	Average Months Unemployment 33–42	Mean Pay at 42 £ per hour
Males					
0 Months	1722	0	1.221	0.963	12.386
1–2 Months	340	1.424	2.379	1.182	12.195
Males					

(continued on next page)

Table 4a (*continued*)

NCDS Sample: Conditional upon reporting wage at 42

Youth Unemployment	No. Individs	Average MonthsYouth Unemployment	Average Months Unemployment 23–33	Average Months Unemployment 33–42	Mean Pay at 42 £ per hour
3–4 Months	226	3.385	2.802	2.960	11.728
5–6 Months	137	5.460	2.925	1.036	11.778
7–12 Months	215	9.107	7.427	3.214	9.990
13+ Months	182	22.429	16.277	6.148	8.461
Total	**2822**				

Simulation of wage penalty allowing for sample selection for males aged 42

Youth Unemployment	I	II	III	IV
	Log Wage Penalty			
1–2 Months	−0.076	−0.039	−0.034	−0.019
3–4 Months	−0.043	−0.052	−0.036	0.002
5–6 Months	−0.063	−0.045	−0.035	−0.001
7–12 Months	−0.176	−0.113	−0.088	−0.019
13+ Months	−0.389	−0.248	−0.213	−0.092
Controls				
Regional Variables aged 23	No	Yes	Yes	Yes
Family and Individual Variables	No	No	Yes	Yes
Occupation and Industry	No	No	Yes	Yes
Unemployment 23–33	No	No	No	Yes
Unemployment 33–42	No	No	No	Yes

Sample size: 4449.

by age 42. Conditioning on education now has a much larger impact in reducing the estimated wage scar. When, in Column III, family, individual and initial job match characteristics are included, the log wage penalty is further reduced. These conditional estimates of the wage penalty at age 42 are now much lower than at age 23 or 33. The conditional wage gap, for over a year of unemployment before the age of 23, is just over 20% at ages 23 and 33 but just 13% at age 42. The pattern for lower levels of youth unemployment shows similar shrinkage in the penalty.

Again we differentiate between the persistence of the wage penalty through repeat unemployment and with continuous employment. Columns IV displays the wage penalty at 42 controlling for unemployment exposure between ages 23–33 and 33–42. Long term youth unemployment of over 6 months damages the wage at 42 even if they remain out of unemployment after the age of 23. The magnitude of this permanent wage scar is around 10% and the results remain statistically significant. Although repeat exposure after age 33 is important for wages, conditioning on later unemployment exposure does not affect the magnitude of the wage penalty associated with youth unemployment. So although the persistence effect of unemployment dies out, a wage scar still prevails. The direct impact of recent unemployment on earnings is strong throughout, such that over a year of cumulated unemployment experience reduces current wages by approximately 30%.

5.4.1. Selection

Sample selection remains an issue hence we undertake a similar simulation based on the residual from the age 33 wage equation for those with missing wages at age 42, as described before. The results suggest that the scars presented in the upper panel of Table 4a are underestimated to a similar degree as at age 33. Table 4b looks at the balanced panel for wage growth prevalent between the age of 33 and 42. Coefficients reported in column I to III show the conditional relationship between wage growth and youth unemployment. The wage recovery is similar for ages 23–33 such that experiencing 5+ months youth unemployment show recovery of 6–8%. This is broadly unaffected by further controls for unemployment between 23–33 and 33–42. To summarise, the recovery of wages among those experiencing 5+ months youth unemployment occurs slowly but continuously through to age 42 unless it is interrupted for some by repeat bursts of unemployment. The repeat incidence was strong between ages 23 and 33 but less so after age 33. Even so the recovery is partial some twenty years later, suggesting a near permanent wage scar.

5.5. Further accounting for unobservable heterogeneity

In the results presented above the wage penalty associated with youth unemployment is sharply reduced once education is controlled for. However, further conditioning only modestly reduces the relationship between youth unemployment and wages. Despite these attempts to capture heterogeneity there may be other characteristics which determine the wage and are correlated with youth unemployment and thus bias our results. Results presented above suggest employers of cohort members aged 23 are not observing and rewarding some ability component unobserved to the researcher, which is correlated with the revealed future unemployment experience. Those with and without further unemployment after age 23 have the same wages at 23 conditional on observed characteristics. However, to ally any remaining concern that youth unemployment experience reflects some unobserved ability we extended the current analysis by adopting an instrumental variables (IV) approach.

The instrument used is the local area (1971 ward level) unemployment rate prevalent as the cohort members first enter the labour market. The intuition for the instrument is that at 16, individual cohort members will not have chosen the area in which they live. However the local unemployment rate drives the labour market experience of the individual. An exogenous source of variation in youth unemployment can be captured by the instrument, allowing an assessment of any bias. A strong instrument must drive wages whilst remaining exogenous to the individual themselves. A likelihood ratio tests confirms the strength of the instrument in predicting the potentially endogenous variable of youth unemployment.[6]

To avoid the requirement of non-linear instruments, a linear model is adopted. Table 5 reports the results from an estimation controlling for the standard set of characteristics used before at age 33. Individuals are sorted into residential areas according to their earnings. Furthermore, the impact of recessions of 1980's and 1990's upon regions of the

[6] The instrument is significant at the 0.02% level.

Table 4b
Dependent Variable is Wage Growth between ages 33–42

	I	II	III
	Wage Growth		
Youth Unemployment			
1–2 Months	−0.008 (0.028)	−0.009 (0.028)	−0.008 (0.028)
3–4 Months	0.010 (0.034)	−0.001 (0.033)	0.006 (0.033)
5–6 Months	0.080 (0.041)**	0.074 (0.041)*	0.080 (0.041)*
7–12 Months	0.065 (0.035)*	0.064 (0.039)*	0.062 (0.039)
13+ Months	0.019 (0.039)	0.011 (0.044)	0.009 (0.045)
Unemployment 23–33			
1–2 Months		0.054 (0.048)	0.061 (0.049)
3–4 Months		−0.019 (0.056)	−0.009 (0.056)
5–6 Months		0.071 (0.065)	0.088 (0.066)
7–12 Months		0.021 (0.055)	0.021 (0.055)
13+ Months		0.071 (0.044)	0.094 (0.045)**
Unemployment 33–42			
1–2 Months			0.087 (0.069)
3–4 Months			−0.066 (0.060)
5–6 Months			−0.046 (0.070)
7–12 Months			−0.068 (0.063)
13+ Months			−0.223 (0.062)**
LT Youth + 23–33 Unemployment		−0.046 (0.060)	−0.052 (0.061)
LT Youth + 33–42 Unemployment			0.054 (0.079)
Controls			
Education Variables	Yes	Yes	Yes
Regional Variables aged 23	Yes	Yes	Yes
Family and Individual Variables	Yes	Yes	Yes
Occupation and Industry	Yes	Yes	Yes

NCDS Sample: Conditional upon reporting wage at 33 and 42

Youth Unemployment	No. Individs	Average Months Youth Unemploy	Mean Pay at 33 £ per hour	Average Unemploy 23–33	Mean Pay at 42 £ per hour
Males					
0 Months	1496	0	8.327	1.148	12.562
1–2 Months	287	1.422	7.945	2.016	11.760
3–4 Months	184	3.380	7.736	2.627	11.558
5–6 Months	118	5.441	7.328	3.018	12.347
7–12 Months	165	9.285	6.492	7.387	10.282
13+ Months	143	22.133	3.013	12.738	8.597
Total	**2393**				

UK was not evenly distributed geographically. Thus to remove any correlation between unemployment after youth and the instrument (as individuals may not have moved far away), local unemployment rates in 1991 are also controlled for. Consequently, local labour market conditions when the individuals were aged 16 will not directly impact

Table 5
OLS and IV Estimates of the Wage Scar Dependent Variable is Wage at age 33

	I	II
	Males	
	OLS	IV
Months of Youth Unemployment	−0.008 (0.001)**	−0.018 (0.011)*
Ward Level Unemployment 33	−0.014 (0.002)**	−0.010 (0.004)***
Controls		
Education Variables	Yes	Yes
Family and Individual Variables	Yes	Yes
Occupation and Industry	Yes	Yes

upon later unemployment conditional upon local unemployment rates in 1991, except through scarring.[7]

One month of youth unemployment will reduce a male's conditional wage at 33 by 0.8%. Through application of the IV technique, the estimated impact of extra months of youth unemployment upon the subsequent wage rises, although the results are not significantly different from the OLS estimates. If heterogeneity was creating a bias in the results and pushing up the perceived scarring effect from youth unemployment, the IV technique should cause the impact of unemployment upon wages to fall. Even if the instrument is capturing unobserved parental characteristics that have sorted families into more deprived areas, the bias should still be reduced through the IV approach and the coefficient fall. Intergenerational transmission produces far less than a complete replication across generations (see Dearden et al., 1997).[8] Another plausible explanation is that the instrument reflects neighbourhood effects which influence youth's unobserved characteristics and impact upon both earnings and employment opportunities for youths. We cannot test for this here. The importance of these results is that the instrumentation does not reduce the magnitude of the scar, suggesting that the wage penalty identified is causal.

6. Conclusion

There is a plethora of empirical evidence to suggest that a spell of unemployment harms an individual's labour market outcomes, both in terms of future employment prospects and in terms of wages. We contribute to these studies by examining the consequence of youth unemployment for men upon the cumulative wage experience up to 26 years later. We look

[7] This disaggregated data on unemployment is not available at age 42 and hence we only focus on age 33 for the IV estimation.

[8] To test this, we first regressed the log household income when cohort members were 16 on the local area unemployment rate and then included controls for the full set of characteristics used in this study. The relationship fell sharply from −0.128 (0.003) to −0.004 (0.003), suggesting that our conditioning variables strongly reduce the correlation between parental traits and the instrument.

at the role of repeat exposure to unemployment and education in preventing or promoting wage recovery, in order to identify the potential for policy intervention. Our findings are that youth unemployment imposes a sizeable wage scar followed by slow recovery over the next twenty years if the individual can avoid further spells of unemployment after age 23. A modest residual wage scar of around 9–11% persists up to twenty years later even for those who have no further unemployment experience.

Sample selection whereby we only consider those with an observed current wage appears to lead to an understatement of the true wage scar. Those with extensive youth unemployment are also at higher risk of further unemployment through to age 33 and this inhibits wage recovery. Upgrading educational qualifications can enhance earnings recovery but it is not frequently undertaken. Initial education attainment, prior to entry into the labour market, however, does not reduce the wage penalties associated with early unemployment. Finally IV estimation suggests that these estimates are not biased upward by unobserved heterogeneity across individuals. Interventions to reduce the exposure of young adults to substantive periods of unemployment could, if successful, have substantial returns in terms of the individual's lifetime earnings and represent a good investment. In addition there is evidence that raising educational qualifications after substantial youth unemployment can lead to enhanced wage recovery.

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Appendix A.1. Characteristics for individuals reporting wage at different periods of observation

		Mean	Report wage 23		Report wage 33		Report wage 42		Always report wage	Never report wage
			yes	no	yes	no	yes	no		
Youth	Mean	3.552	2.215	8.62	3.327	4.163	2.848	4.774	1.928	8.437
Unemployment	Observations	4449	3520	929	3248	1201	2822	1627	2020	263
Unemployment	Mean	4.049	2.149	11.249	3.637	5.166	3.014	5.845	1.609	10.443
23–33	Observations	4449	3520	929	3248	1201	2822	1627	2020	263
Unemployment	Mean	2.404	1.802	4.687	2.086	3.266	1.649	3.676	1.171	5.532
33–42	Observations	4449	3520	929	3248	1201	2822	1627	2020	263
Wage 23	Mean	2.715	2.715	x	2.755	2.586	2.78	2.584	2.802	x
	Observations	3520	3520		2687	833	2344	1176	2020	x
Wage 33	Mean	7.714	7.83	7.159	7.714	x	7.921	7.137	7.997	x
	Observations	3248	2687	561	3248	x	2393	855	2020	x
Wage 42	Mean	11.845	11.901	11.568	11.983	11.071	11.845	x	12.061	x
	Observations	2822	2344	478	2393	429	2822	x	2020	x

Appendix A.2. Family and Individual Specific Characteristics

Full regressions for Wages at Age 23, 33 and 42: Men

Variable	Wage at 23 (Table 2a column IV)	Wage at 33 (Table 3a column IV)	Wage at 42 (Table 4a column IV)
Youth Unemployment			
1–2 Months	−0.011 (0.020)	−0.011 (0.021)	−0.020 (0.027)
3–4 Months	−0.031 (0.024)	−0.067 (0.025)**	−0.005 (0.033)
5–6 Months	−0.095 (0.031)**	−0.071 (0.030)**	0.027 (0.041)
7–12 Months	−0.091 (0.028)**	−0.109 (0.028)**	−0.076 (0.038)**
13+ Months	−0.207 (0.034)**	−0.149 (0.032)**	−0.105 (0.044)**
Education Dummy Variables			
Lower vocational qualifications	0.103 (0.062)*	0.183 (0.057)**	0.119 (0.081)
Lower academic (below O'level or equivalent)	0.044 (0.048)	0.086 (0.049)*	0.108 (0.068)
Intermediate Vocational (equivalent to O'level)	0.062 (0.045)	0.104 (0.049)**	0.056 (0.063)
O'level or equivalent	0.066 (0.021)**	0.123 (0.021)**	0.172 (0.027)**
Higher vocational (Akin to A'level)	0.108 (0.023)**	0.171 (0.024)**	0.225 (0.030)**
A'level or equivalent	0.120 (0.034)**	0.283 (0.034)**	0.433 (0.041)**
Level 5 vocational (equivalent to degree)	0.124 (0.028)**	0.273 (0.028)**	0.281 (0.036)**
Degree or equivalent	0.077 (0.032)**	0.369 (0.032)**	0.471 (0.036)**
Unemployment 23–33			
1–2 Months		−0.033 (0.036)	0.044 (0.048)
3–4 Months		−0.160 (0.042)**	−0.132 (0.056)**
5–6 Months		−0.197 (0.049)**	−0.116 (0.064)*
7–12 Months		−0.176 (0.038)**	−0.161 (0.053)**
13+ Months		−0.320 (0.031)**	−0.190 (0.044)**
Unemployment 33–42			
1–2 Months			−0.050 (0.065)
3–4 Months			−0.141 (0.060)**
5–6 Months			−0.088 (0.068)
7–12 Months			−0.210 (0.060)**
13+ Months			−0.303 (0.058)**

	Wage at 23 (Table 2a column III)	Wage at 33 (Table 3a column IV)	Wage at 42 (Table 4a column IV)
LT Youth+23–33 Unemployment		0.055 (0.042)	0.094 (0.059)
LT Youth+33–42 Unemployment			0.047 (0.071)
Regional Dummy Variables			
Region 2	−0.047 (0.031)	0.048 (0.033)	0.060 (0.046)
Region 3	−0.104 (0.033)**	0.014 (0.033)	−0.016 (0.046)
Region 4	−0.077 (0.032)**	0.027 (0.034)	−0.003 (0.047)
Region 5	−0.039 (0.034)	0.029 (0.035)	−0.040 (0.048)

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Appendix A.2 (*continued*)

	Wage at 23 (Table 2a column III)	Wage at 33 (Table 3a column IV)	Wage at 42 (Table 4a column IV)
Regional Dummy Variables			
Region 6	−0.125 (0.043)**	0.060 (0.043)	0.023 (0.059)
Region 7	−0.143 (0.035)**	0.060 (0.036)*	0.030 (0.049)
Region 8	−0.003 (0.028)	0.195 (0.029)**	0.151 (0.041)**
Region 9	−0.087 (0.037)**	−0.038 (0.038)	−0.074 (0.053)
Region 10	−0.092 (0.033)**	0.018 (0.034)	−0.014 (0.047)
Region 11	−0.027 (0.159)	0.012 (0.125)	0.110 (0.150)
Family Effects			
Father stayed in FT edu >age 16	0.006 (0.021)	−0.021 (0.021)	−0.025 (0.027)
Mother staying in FT edu >age 16	0.019 (0.020)	−0.011 (0.020)	−0.028 (0.027)
Ethnic origin Non-white	0.064 (0.051)	0.048 (0.048)	0.044 (0.067)
Ever had Education special needs	−0.181 (0.047)**	−0.131 (0.042)**	−0.129 (0.062)**
Ever lived in financial deprivation	−0.011 (0.020)	0.020 (0.020)	0.005 (0.027)
Ever lived in Local Authority Care	−0.003 (0.037)	0.043 (0.035)	0.131 (0.052)**
Family Total Income aged 16	−0.010 (0.021)	0.002 (0.021)	0.077 (0.029)**
Individual Effects			
Negative anxiety traits aged 7, Score1	−0.010 (0.018)	0.015 (0.018)	0.015 (0.025)
Negative anxiety traits aged 7, Score2	−0.021 (0.018)	0.001 (0.018)	0.004 (0.025)
Negative anxiety traits aged 7, Score4	−0.012 (0.022)	−0.032 (0.022)	−0.005 (0.030)
Low School attendance (<75%)	0.004 (0.054)	−0.031 (0.026)	−0.005 (0.037)
Sick1	0.016 (0.017)	0.013 (0.017)	−0.025 (0.023)
Sick2	0.025 (0.027)	−0.027 (0.027)	−0.046 (0.036)
Probation by age 16	0.012 (0.028)	0.037 (0.028)	−0.012 (0.040)
Vocabulary, 2nd quintile score aged 11	0.006 (0.022)	0.055 (0.023)**	0.077 (0.031)**
Vocabulary 3rd quintile score aged 11	−0.007 (0.024)	0.039 (0.024)	0.075 (0.033)**
Vocabulary 4th quintile score aged 11	−0.004 (0.026)	0.054 (0.025)**	0.080 (0.035)**
Vocabulary 5th quintile score aged 11	−0.021 (0.027)	0.061 (0.028)**	0.055 (0.037)
Arithmetic 2nd quintile score aged 11	0.025 (0.024)	0.023 (0.024)	0.032 (0.032)
Arithmetic 3rd quintile score aged 11	0.040 (0.024)*	0.035 (0.024)	0.039 (0.033)
Arithmetic 4th quintile aged 11	0.060 (0.025)**	0.063 (0.025)**	0.033 (0.033)
Arithmetic 5th quintile score aged 11	0.099 (0.026)**	0.090 (0.026)**	0.055 (0.035)
IQ 2nd quintile score aged 11	−0.002 (0.022)	−0.000 (0.022)	0.021 (0.030)
IQ 3rd quintile score aged 11	−0.011 (0.023)	0.033 (0.024)	0.038 (0.032)
IQ 4th quintile score aged 11	0.006 (0.024)	0.037 (0.025)	0.028 (0.033)
IQ 5th quintile score aged 11	0.010 (0.026)	0.053 (0.026)**	0.074 (0.035)**
Mining	0.364 (0.048)**	0.158 (0.049)**	0.133 (0.066)**
Chemicals	0.253 (0.042)**	0.097 (0.043)**	0.183 (0.058)**
Engineering	0.196 (0.034)**	0.063 (0.036)*	0.111 (0.047)**
Texstiles	0.176 (0.036)**	0.064 (0.037)*	0.019 (0.049)
Construction	0.186 (0.036)**	0.093 (0.039)**	0.080 (0.051)
Retail	0.080 (0.033)**	−0.008 (0.035)	−0.009 (0.046)
Transport	0.172 (0.043)**	0.085 (0.043)*	0.064 (0.058)
Finance	0.172 (0.040)**	0.151 (0.041)**	0.188 (0.055)**
Administration	0.100 (0.036)**	0.032 (0.037)	0.013 (0.049)

Appendix A.2 (*continued*)

	Wage at 23 (Table 2a column III)	Wage at 33 (Table 3a column IV)	Wage at 42 (Table 4a column IV)
Occupation dummies			
Occ 1	−0.032 (0.054)	0.115 (0.047)**	0.179 (0.062)**
Occ 2	0.050 (0.048)	0.034 (0.038)	0.016 (0.050)
Occ 3	0.036 (0.045)	0.012 (0.037)	0.011 (0.048)
Occ 4	−0.006 (0.046)	−0.098 (0.037)**	−0.112 (0.049)**
Occ 5	−0.071 (0.047)	−0.121 (0.039)**	−0.133 (0.051)**
Occ 6	−0.080	−0.085	−0.107

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