Disability, Employment and Earnings: An Examination of Heterogeneity

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Summary

This paper uses information from an ad-hoc module on disability in the 2001 UK Labour Force Survey to identify the heterogeneity that exists within the disabled group and examine its impact on labour market outcomes. The probability of employment and hourly earnings are modelled for disabled individuals with controls for individual characteristics and the heterogeneity of the disability. The type, severity, duration and age of disability onset are found to be important determinants of employment but there is less evidence to support the influence of within group heterogeneity on earnings.

JEL Classification: I10, J20, J30.

Keywords: Disability, heterogeneity, labour market

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1. Introduction

Whilst international evidence that compares labour market outcomes between disabled and non-disabled individuals has grown rapidly (see Kidd et al., 2000 and Madden, 2004 for UK evidence), less attention has been paid to heterogeneity within the disabled group and its implications for labour market outcomes. However, the features of disability that differentiate it from empirical analysis on the grounds of gender and ethnicity, such as it being a limitation rather than a characteristic and its fluid nature, give rise to potential dramatic heterogeneity within the disabled group. Since even the most obvious within group differences, such as in the type and severity of an impairment, may be expected to impact on in work productivity, non-work income, the disutility of work and discrimination it is likely that these features are fundamental in the analysis of labour market outcomes of the disabled. Indeed, there has been a longstanding recognition of the policy importance of this issue, with Baldwin and Johnson (1994), stating 'the success of the Americans with Disabilities Act may depend on the extent to which the implementation of its policies recognises the differences among persons with disabilities and among types of impairments' p14. Moreover, this has been more recently emphasized again in the UK by Berthoud (2003).

Despite this, studies have consistently split the population into two or more sub groups and identified the disadvantage associated with disability as if it were homogeneous.[2] This is, in part, a result of restrictions imposed by data availability and the widespread application of standard decomposition techniques. Therefore, most studies have provided limited information with respect to questions like which features of the disability give rise to the disadvantage? This is not only an important question in its own right but may provide additional insights into the processes that determine the disadvantage of the entire group. Furthermore, as Silverstein et al. (2005) note the failure to account for *within* group diversity may lead to misleading inferences in comparisons *between* groups.

[2] There remains significant debate about the most appropriate definition of disability and average employment rates vary considerably by definition (Berthoud, 2003). This issue is avoided here by examining heterogeneity within the widest definition of disability (see Section 2).

A limited number of recent UK studies have begun to consider individual aspects of heterogeneity including the effect of the severity of the disability (Berthoud, 2003), the type of disability (Kidd et al., 2000 and Jones et al., 2006) and, using longitudinal data, the duration of the disability (Jenkins and Rigg, 2004 and Burchardt, 2003). However, restrictions on data availability have limited a more comprehensive analysis of heterogeneity.

This paper, by exploiting additional questions introduced in the UK Labour Force Survey (LFS) as part of an ad hoc module on the employment of disabled people is able to consider several forms of heterogeneity of a disability simultaneously and examine their implications for both employment and labour market earnings.[3] Importantly, this data set also enables the consideration of an additional form of heterogeneity, the age of disability onset, which has not been previously examined in the UK. As Baldwin and Johnson (2001) argue, the time of onset has important implications for labour market outcomes since disabled children face different labour market issues to disabled adults. For children the disability will affect their pre-labour market experiences, entry to the labour market and entire labour market history. However, more recently, Loprest and Maag (2007) and Wilkins (2004) outline the important role adaptation may have. If disabled children are more able to adapt to their disability than individuals who become disabled in later life this will reduce the labour market impact of a childhood disability.

The remainder of the paper is structured as follows. A concise review of previous evidence relating to different forms of heterogeneity is given in section 2 together with a discussion of the potential role of the age of disability onset. Section 3 then considers the advantages of using this data and outlines the econometric methodology. Section 4 presents the key results before the final section briefly concludes.

[3] The module was introduced in the European Labour Force Survey to provide comparable information on the labour market situation of people with disabilities in the EC in preparation for the 2003 European Year of People with Disabilities (see Dupre and Karjalainen, 2003).

2. Empirical Evidence

Studies virtually always control for heterogeneity in terms of characteristics such as age, gender or region of residence however, the heterogeneity that is generated by the impairment itself is frequently neglected. There are some exceptions, for example, studies that use self-reported information confirm the negative effect of disability on labour market performance increases with severity (see Hale et al. 1998 for US evidence and Hum and Simpson, 1996 for evidence relating to Canada) and with the number of impairments (Hum and Simpson, 1996), consistent with the negative influence on productivity. Berthoud (2003) uses more 'objective' measures of severity from the Disability Survey, which formed an extension of the UK Family Resources Survey in 1996/7, and confirms the negative association between severity and employment.[4] More 'objective' measures of health have also been included in several US studies on earnings, although the focus has been to control for productivity differences rather than examine the heterogeneity itself (Baldwin and Johnson, 1994, 1995, 2000 and Schumacher and Baldwin, 2000). The type of impairment can also affect labour market outcomes through a productivity and/or discrimination effect. The UK evidence suggests that those with mental health problems face the most severe labour market disadvantage (Blackaby et al., 1999, Kidd et al., 2000 and Jones et al., 2006).[5]

The fluid nature of disability gives rise to dynamic sources of heterogeneity and longitudinal data analysis in the UK has identified a negative employment effect associated with the duration of a disability (Jenkins and Rigg, 2004 and Burchardt, 2003), although the process through which this operates is less clear. Whilst there are advantages of using longitudinal data in this context this approach also has certain limitations. The duration measure is censored from both directions and is therefore constrained by the length of the panel. This is limited to a single year in the LFS used by Burchardt (2003) and although this increases to six years in Jenkins and Rigg (2004) analysis of the BHPS the number of individuals who experienced disability onset was limited at 280. Importantly, these studies only consider disability onset

[4] He also finds that the disabled are more sensitive to other disadvantages e.g. living in high unemployment area or being over 50 but this socio-demographic heterogeneity is not examined here.
[5] See Bartel and Taubman (1979) and Zwerling et al. (2002) for US studies comparing the type of impairment.

among adults and hence ignore the potentially different role of disability onset prior to labour market entry.

Baldwin and Johnson (2001) highlight the theoretical importance of the age of disability onset. Individuals who are disabled at birth may be limited in terms of education, face pre labour market discrimination and their disability may affect their entire labour market experience. Individuals who experience age onset disability will face a different set of labour market issues, including retaining employment and promotion opportunities. In contrast, Loprest and Maag (2007) and Wilkins (2004) in the only known international studies to examine this issue find, using cross sectional data from the US and Australia respectively, that early disability onset has a positive effect on employment relative to older disability onset. Both studies suggest that this is a result of adaptation. Wilkins (2004) argues that disabled youths will have more time and greater incentives to adapt to the disability and Loprest and Maag (2007) add that disabled children choose careers in which their disability can be more easily accommodated. So the adaptation effect may occur because over time an individual with a given disability becomes more productive or because that early onset enables the individual to make labour market choices, for example occupation, that minimise the impact of the disability on the labour market outcomes.

It is not only the heterogeneity of the disability itself that has potentially important labour market implications, the impact of the disability will depend on the environment in which an individual is situated (Silverstein et al. 2005). Important influences may include the availability of medical care, the attitudes of others and government policies and legislation. Probably the most significant influence in this respect is the availability of an alternative source of income through the benefit system. Since one quarter of the UK population with a long-term health problem is in receipt of any source of disability or sickness benefit this creates a crucial difference within the disabled group, with obvious implications for work incentives. Another significant change, that arises from the introduction of the Disability Discrimination Act (DDA) in 1995, is the obligation on employers to make reasonable adjustment to their premises and employment arrangements to facilitate and enhance the access to employment for the disabled. The effects on employment and earnings are not clear. While access to employment, and productivity in work should increase the additional

cost induced by these accommodations may reduce the employment of disabled workers[6] (Acemoglu and Angrist, 2001) and or result in employers passing on these costs on to disabled workers in terms of a pay penalty (Baldwin and Johnson, 2001).[7] In the UK however, the Access to Work scheme provides financial support for employers when making such modifications, which should limit the negative impact of this requirement of the legislation.

3. Data and Methodology

3.1 The data

This study uses additional questions introduced in an ad hoc module on disability in the Spring 2002 Quarter of the UK LFS. This ad hoc module contains important retrospective information on the duration and cause of disability in addition to more typical questions relating to the severity and type of the disability. Importantly therefore, this additional information combined with the scale of the LFS means multiple aspects of heterogeneity can be examined simultaneously. Moreover, information on the duration and cause of the disability can be used to construct the age of disability onset.

There are, however a number of limitations of this data which should be acknowledged. Most obviously and common to all retrospective questions, the information on duration may suffer from recall error. The bounded nature of this measure, particularly with an upper bound of ten years should limit this effect.[8] However, as a result the derived measure of the age of disability onset is less accurate and as such, information about the cause of disability is used to enhance its construction. The data is also restricted to a single cross section, which means no information is available about the changes to the disability (particularly severity) and characteristics (most importantly actual experience) over time.

[6] Since a workplace accommodation is only observable for the employed the issue of employment is not examined here.

[7] Gunderson and Hyatt (1996) consider the impact on earnings using a specialized dataset from Ontario in early 1980's. They find that the proportion of the cost of the accommodation passed on to workers is higher if they are injured at another firm.

[8] Forster and Jones (2002) discuss the issue of recall bias in their data on smoking behaviour and find evidence of 'heaping', that is, individuals rounding to the nearest 5 or ten year mark but their results are not sensitive to controls for recall bias.

3.2 Econometric Methodology

The econometric methodology modifies previous analysis of the impact of disability on employment and earnings (Kidd et al., 2000 and Jones et al., 2006) to focus on within rather than between group differences. This emphasis means the sample is restricted to individuals of working age who self report a long-term health problem[9]. Full-time students are also excluded from the analysis. Employment equations are modelled empirically using probit models estimated separately by gender:

$$E^*_i = \gamma\ Y_i + \beta\ X_i + \mu_i \qquad (1)$$

where the observed variable E_i is related to the latent variable E^*_i as follows:[10]

$$E_i = \begin{cases} 1 & \text{if } E^*_i > 0 \\ 0 & \text{otherwise} \end{cases}$$

Y_i contains productivity related characteristics including age, qualifications, ethnicity, marital status, the presence of dependent children, region of residence and housing tenure.[11] However, these variables are supplemented with a range of variables relating to the disability, X_i. The significance of $\hat{\beta}$ would indicate that estimates based on a model without controls for within group differences will suffer from omitted variable bias.

The variables that should be included in X_i are less well established, but can be separated into cross sectional and dynamic variables. Cross sectional forms of heterogeneity include 4 classifications for the type of main health problem namely, limbs, sight and hearing, chest and breathing and mental health (the base group is

[9] The additional questions relating to the duration, cause and severity of the disability were only asked to those with a long-term health problem. Those with a long-term health problem represent 26.97% of the male working age sample and 25.72% of the respective female sample. Whilst this definition does not coincide with more standard work limiting or DDA definitions it maximises the number of observations for the analysis and considers the entire heterogeneity within the disabled group.

[10] Employment is defined using ILO definitions in the LFS and therefore includes, employees, the self employed, those on government training schemes and unpaid family workers. The non-employed include both the unemployed and the inactive.

[11] A full description of variables is given in the Appendix.

other), three dummy variables capture self-reported measures of severity (kind, amount and mobility) and a control for individuals with multiple health problems. Two variables relating to the receipt of incapacity or any other sickness related benefit are also included.

A measure of the duration of a disability will capture the difference in the reward to experience in the presence of a disability. A lower return may be expected if the presence of a disability limits labour market experience and training relative to a period without a disability.[12] However, controlling only for duration assumes that the impact of a disability is constant across the lifecycle. The effect of differences in observable characteristics caused by age of onset will be captured by the controls in Y_i (e.g. education). However, the age of onset will capture the influence of productivity related unobservables that are related to age of onset and any difference in the productivity effect caused through differences in the ability to adapt on the basis of age.[13] A central assumption underpinning the above analysis is that severity is constant over time. The impact of duration and age of onset may depend on the severity at onset and if severity changes over time, however no information is available to control for this.

A measure of the age of disability onset is constructed from the information on age, duration and the cause of the disability (at birth). The additional information from the cause of a disability destroys the direct relationship between age, duration and age of disability onset. For the same reason, (following Wilkins, 2003), dummy variables are used for duration and experience replaces age in the earnings equation.[14]

There are some limitations in introducing dynamic concepts in cross sectional analysis, which have been emphasised in evidence relating to the assimilation of immigrants. Borjas (1985) argues that cross sectional estimates of the impact of the duration of residence in the home country on earnings will be affected by selection

[12] If the ability to adapt is related to the duration of the disability this will influence duration in the opposite direction.
[13] Wilkins (2004) notes that the age of disability onset may capture unobserved skill, if, for example, older manual workers suffer from age onset disability.
[14] As Wilkins (2003) notes the use of dummy variables does not solve the identification issue unless it is assumed the impact of duration is common within the groups.

effects and will include the influence of any change in cohort quality. The selection problem occurs if poor labour market performance increases the probability of returning to the country of origin, leaving a higher quality sample at long durations. If the unobserved quality of new immigrants deteriorates over time the impact of duration will also be overestimated due to cohort differences. In the context of disability, a selection problem would arise if labour market performance affects the probability of exit from disability giving rise to non-random selection at long durations. The justification hypothesis argues that there are incentives for non-employed individuals to over-report disability, however, there appears to be less incentive to relate exits from disability to labour market outcomes and thus emigration may be more sensitive to labour market outcomes than disability.[15] The interpretation of duration in this model has to be based on the assumption that unobserved quality of cohorts is constant.[16] If, for example, the growth in the disabled population has lead to deterioration in unobserved quality (or motivation) the estimate on duration will be upward biased. However, cohort effects cannot be identified without repeated cross sectional data.

For a subset of employed individuals the log of hourly earnings is modelled, with a Heckman (1976) correction for selection into employment as follows:[17]

$$W_i = \alpha Z_i + \delta X_i^W + \varepsilon_i \qquad (2)$$

where Z_i includes productivity related characteristics and a set of controls for the type of employment, such as industry, occupation and sector. The controls for heterogeneity outlined previously are supplemented with two employment related characteristics to form X_i^W. The additional variables include a control for individuals working in sheltered employment and a variable indicating the receipt of assistance to

[15] The evidence relating to justification bias remains mixed (for a recent study see Benitez-Silva et al. 2004).
[16] Changes in the benefit regime, retirement and social norms may all give rise to cohort effects in this context.
[17] Information about earnings is only asked to employees in waves 1 and 5 of the LFS. The results from the employment selection equation for the Heckman correction are qualitatively similar to the employment equations above but are not presented here.

help work.[18] Identification is achieved in the model by including the presence of dependent children and another earner in the household in Y_i but not Z_i and excluding benefit income from X_i^W.[19]

[18]Examples include special adaptations or equipment, support in getting to and from work, understanding by superiors or colleagues, assistance in the kind of work, assistance in the amount of work and assistance in getting around at work.

[19] The variables relating to dependent children and another earner in the household have a significant influence on employment, but when estimating an uncorrected wage equation they are not significant determinants of earnings. Moreover, the results on earnings are not sensitive to modifications of the exclusion restriction or to estimation without the selection correction.

4 Results

4.1 Descriptive statistics

Table 1 presents the mean values for the variables used in the regression analysis for males and females respectively. It is notable that a disability does not necessarily affect work. About 55% report their disability affects the kind of work they can do, about 45% that find it affects the amount of work they can do and nearly a third report a problem in getting to work due to their disability. In accordance with the work-limiting definition of disability 59% of men and 57% of women report a disability that affects either the type or amount of work they can do. Just less than half of those with a long-term health problem report more than one health problem and the most common type of main health problem for men is associated with either back or neck (17%) or heart, blood pressure and circulation (17%), this is slightly higher than chest or breathing (13%) or legs and feet (12%).

Disability also varies in its permanency, nearly half of the disabled population have a disability that has lasted more than 10 years and an additional 20% have a disability lasting between 5 and 10 years.[20] In terms of the age of disability onset the average age is 29 years for men, slightly higher than for females and those born with their disability comprise nearly 15% of the population. Only 2% of the disabled population in work are employed in sheltered employment and more surprisingly even after several years of the DDA only 8% of the work limited disabled report assistance in work.

Table 2 considers the impact of the age of disability onset on observable characteristics, namely occupation and education. In terms of aggregate occupation groups the employment structure of those disabled at birth is relatively similar to those disabled in adulthood with the main exception being that those disabled at birth are less likely to be currently employed as process, plant and machine operatives. This may be the result of occupational choice of those disabled at birth but could also reflect a higher rate of selection (due to occupational risk) into disability amongst older workers employed in this group. There is more evidence of significant

[20] As Burchardt (2000) and Jenkins and Rigg (2004) note a cross sectional sample will contain a large proportion of long-term disabled.

differences in the level of qualifications, but it is those disabled at birth who are more likely to be qualified at degree level and are less likely to have no qualifications which does not support the notion that individuals who are disabled at birth are more limited in terms of education than those with age onset disability.[21]

4.2 Employment

Table 3 displays the estimates from the employment probit model for males and females respectively. The results of standard productivity related variables are in accordance with expectations and therefore the focus of the discussion relates to the controls for heterogeneity within the disabled group. A likelihood ratio test indicates the controls for within group differences are significant at the 1% level for both males and females. Indeed, for males the pseudo R squared increases from 0.26 to 0.55 with the inclusion of the within group controls confirming their importance. Moreover, the features of a disability are significant after the inclusion of controls for receipt of disability benefit income, which consistent with the rules governing benefit receipt has a strong negative effect on employment.

Consistent with previous evidence self reported information relating to the work limiting nature of the health problem has a negative effect on employment. The marginal effect of a mobility restriction is particularly strong and is greater than the effect of limitations on either the kind or amount of work.[22] The type of health problem is also important and, relative to the base group, individuals with mental health problems have a significantly lower probability of employment (consistent with Kidd et al., 2000). In addition, for both genders the number of recorded health problems has a significant negative effect on employment, confirming the additional difficulty experienced by those with multiple health problems.

Consistent with longitudinal evidence in the UK, shorter durations of the disability are associated with higher employment probabilities relative to the base group of more

[21] Multivariate analysis which controls for personal characteristics and features of the disability confirm that age of disability onset is not a significant determinant of highest qualification or current occupation of the disabled. The type and severity of the disability are important determinants of both occupation and qualification.

[22] The LFS is limited to self-reported information, which is standard in the literature but may be subject to justification bias (Bound, 1991). If justification bias is present it would mean the work limiting severity measures will overestimate their true effect.

than 10 years, but this is only significant for those with the very shortest durations (less than a year). This is consistent with individuals remaining in work until they are more aware of the permanency of their condition and possibly using sick leave in the period immediately after disability onset to remain employed. The negative sign on the age of disability onset suggests that while controlling for duration, onset has a more severe impact as an individual ages. However, the positively signed quadratic term indicates that it is actually disability onset in prime age that has the worst impact on employment. There is no evidence to suggest that onset prior to labour market entry increases the disadvantage consistent with Wilkins (2004) and Loprest and Maag (2007) arguments of adaptation.[23]

4.3 Earnings

Table 4 presents the results for the earnings equations for males and females respectively.[24] It is clear that within group heterogeneity is a less important determinant of earnings than of employment. After controlling for the type of work the only measures of severity that influence earnings are the number of health problems for men and mobility limitations for women. In a similar manner to employment, mental health problems also have the most negative influence on earnings across both genders, although it is only significant in the female specification.

The duration of the disability has no impact on earnings for men, whilst for women the results appear counterintuitive with individuals disabled for shorter durations experiencing lower earnings than similar long term disabled.[25] The age of disability onset remains significant for disabled men, with a similar relationship to that in the employment equation. However, the greatest wage penalty is experienced by disability onset relatively early in an individual's career.

[23] The evidence in Table 2 suggests onset at birth also has a limited effect through observables such as education.

[24] A more restricted specification was also estimated which excluded the controls for type of employment since the within group differences may affect earnings through occupational choice. Since the results are fairly robust to the inclusion of the additional controls, with the exception of some of the severity measures, they are not presented here.

[25] The negative influence of short durations would be consistent with the effect of adaptation through time outweighing the negative influence of time out of the labour market or reductions in human capital investment.

The measures that control for being in sheltered employment and having assistance to aid work have no significant effect on earnings. It should, however, be noted that since the source of funding for the assistance is not identified this measure may include government or self funded modifications. Therefore, there is no evidence (after controlling for the type of employment) to suggest disabled workers pay for taking opportunities created to help their entry into employment.

5. Conclusion

There is a well-established and internationally consistent literature that documents the labour market disadvantage faced by disabled individuals relative to their non-disabled counterparts. The evidence presented here for the UK confirms that within group differences on the basis of the type, severity and duration of the disability are important determinants of employment for both men and women despite the controls for additional elements of heterogeneity, including receipt of disability benefits. The significance of these variables suggests that previous analysis based on a more restricted specification potentially suffers from omitted variable bias and inferences may be misleading. This paper also establishes an influence of the age of disability onset in the UK. Individuals who experience disability onset in childhood or youth are more likely to be in employment than those with disability onset in prime age consistent with them being more able to adapt to their disability.

Whilst the additional information collected as part of this ad hoc module on disability provides additional insights into the processes involved, the data are not without their limitations and the features of heterogeneity are certainly not exhaustive. Indeed, this paper has highlighted the difficulties involved with using the currently available cross sectional or longitudinal evidence given the multiple forms heterogeneity may take. If a disability survey is commissioned in the UK (see, Purdon 2005, for a feasibility study) it is essential that this contains retrospective questions relating to disability onset, a longitudinal element which traces changes in both the disability and labour market performance, and sufficient observations for the examination of within group differences. It is this type of evidence that will aid policymakers who that seek to encourage the disabled into employment in a country with one of the highest rates of working age disability.

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Table 1 Variable Means

	Employment			Earnings	
	Male	Female		Male	Female
Employment	0.611	0.557	Log (hourpay)	2.192	1.929
Age	46.733	43.520	Sheltered	0.026	0.035
Age sq	2337.068	2019.465	Assistance	0.024	0.033
Dur1	0.058	0.063	Experience	26.778	24.553
Dur2	0.067	0.073	Experience sq	874.123	743.427
Dur3	0.079	0.083	Tenure	120.915	85.335
Dur4	0.129	0.131	Tenure sq	29333.600	15015.260
Dur5	0.206	0.209	Occ2	0.128	0.092
Age onset	29.400	27.495	Occ3	0.128	0.134
Age onset sq	1207.670	1047.176	Occ4	0.066	0.235
Kind	0.568	0.542	Occ5	0.151	0.019
Amount	0.456	0.460	Occ6	0.028	0.142
Mobility1	0.191	0.174	Occ7	0.033	0.119
Mobility2	0.127	0.151	Occ8	0.145	0.034
Number health	2.071	2.115	Occ9	0.146	0.140
Health1	0.340	0.325	Ind1	0.012	0.006
Health2	0.050	0.032	Ind2	0.019	0.003
Health3	0.434	0.381	Ind3	0.249	0.086
Health4	0.077	0.092	Ind4	0.071	0.013
White	0.948	0.936	Ind5	0.160	0.197
Single	0.246	0.223	Ind6	0.104	0.040
Married	0.618	0.564	Ind7	0.140	0.141
Qual1	0.114	0.097	Ind8	0.204	0.460
Qual2	0.067	0.093	Part	0.069	0.421
Qual3	0.304	0.138	Public	0.224	0.380
Qual4	0.142	0.242	Small firm	0.297	0.367
Qual5	0.145	0.158	Temporary	0.038	0.056
Other earner	0.526	0.599			
Incapacity benefit	0.196	0.122			
Other sickness	0.079	0.102			
Social housing	0.223	0.259			
Owned	0.242	0.190			
Mortgaged	0.458	0.468			
Child 19	0.533	0.686			
Child 2	0.036	0.044			

Table 2. Qualification and occupation by age of disability onset.

	At Birth	Adult		At Birth	Adult
Managers and senior officials	12.80	13.62	Degree or higher degree	13.65*	9.67
Professional occupations	11.11	10.14	Other higher education	6.94	7.76
Associate professional and technical	14.29*	12.34	A level	19.97*	22.38
Administrative and secretarial	14.92	13.72	O level	20.97*	17.26
Skilled trades	11.80	13.12	Other	13.53*	15.70
Personal service occupations	7.80	7.60	None	24.33*	26.67
Sales and customer service occupations	6.87	6.37	Don't know	0.62	0.56
Process, plant and machine operatives	7.62*	10.27			
Elementary occupations	12.80	12.81			

Notes to table: *denotes a statistically significant difference in the mean from those disabled as adults at the 5% level using a two sample t test.

Table 3 Employment probits

	Male		Female	
	Coefficient	Standard Error	Coefficient	Standard Error
Constant	-2.2628 ***	0.293	-1.9300 ***	0.306
Age	0.1572 ***	0.012	0.1260 ***	0.014
Age sq	-0.0020 ***	0.000	-0.0016 ***	0.000
Duration1	0.2569 **	0.131	0.2822 **	0.119
Duration2	0.1639	0.125	0.1691	0.114
Duration3	0.1188	0.120	0.0842	0.110
Duration4	0.0202	0.107	0.0161	0.099
Duration5	-0.0284	0.094	0.0463	0.086
Age onset	-0.0139 ***	0.005	-0.0085 *	0.004
Age onset sq	0.0002 ***	0.000	0.0001 **	0.000
Kind	-0.3509 ***	0.053	-0.3289 ***	0.049
Amount	-0.3495 ***	0.054	-0.3536 ***	0.050
Mobility1	-0.9933 ***	0.068	-0.9519 ***	0.066
Mobility2	-0.4356 ***	0.055	-0.4744 ***	0.049
Number health	-0.0519 ***	0.015	-0.0652 ***	0.013
Health1	0.0610	0.068	0.0817	0.053
Health2	0.0693	0.102	-0.1515	0.102
Health3	-0.0266	0.068	-0.0448	0.051
Health4	-0.4179 ***	0.090	-0.4342 ***	0.076
White	0.4433 ***	0.080	0.3304 ***	0.071
Single	-0.1874 ***	0.072	-0.0421	0.063
Married	0.0415	0.061	-0.3353 ***	0.050
Qual1	0.1960 ***	0.071	0.8532 ***	0.073
Qual2	0.2111 **	0.084	0.6286 ***	0.067
Qual3	0.3228 ***	0.054	0.4960 ***	0.059
Qual4	0.1865 ***	0.064	0.4486 ***	0.050
Qual5	0.2922 ***	0.062	0.3502 ***	0.054
Other earner	0.4285 ***	0.041	0.4371 ***	0.042
Incapacity Benefit	-1.6293 ***	0.072	-1.3794 ***	0.082
Other sickness	-0.5802 ***	0.068	-0.5496 ***	0.066
Social housing	-0.2437 ***	0.074	-0.2173 ***	0.069
Owned	0.1618 **	0.075	0.0229	0.074
Mortgaged	0.5485 ***	0.071	0.4160 ***	0.066
Child 19	-0.0556 **	0.024	-0.2983 ***	0.021
Child 2	0.0658	0.108	-0.4806 ***	0.079
Observations	9547		8920	
Log Likelihood	-2875.23		-3500.18	
LR Chi Sq	7007.51 (0.00)		5248.04 (0.00)	
Pseudo R Sq	0.55		0.43	

Notes to table: Specification includes a full set regional dummies not reported here. ***, ** and * denote significance at the 1%, 5% and 10% level respectively.

Table 4 Earnings Equations

	Male		Female	
	Coefficient	Standard Error	Coefficient	Standard Error
Constant	1.8303 ***	0.145	1.9820 ***	0.132
Sheltered	-0.0579	0.065	-0.0769	0.052
Assistance	-0.0727	0.068	0.0666	0.056
Experience	0.0251 ***	0.004	0.0167 ***	0.004
Experience sq	-0.0005 ***	0.000	-0.0003 ***	0.000
Tenure	0.0013 ***	0.000	0.0009 ***	0.000
Tenure sq	0.0000 ***	0.000	0.0000	0.000
Duration1	0.0016	0.069	-0.1742 ***	0.064
Duration2	0.0524	0.065	-0.0967	0.060
Duration3	0.0369	0.063	-0.1590 ***	0.060
Duration4	0.0293	0.058	-0.0930 *	0.053
Duration5	-0.0022	0.050	-0.0807 *	0.046
Age onset	-0.0042 *	0.002	0.0009	0.002
Age onset sq	0.0001 **	0.000	0.0000	0.000
Kind	-0.0367	0.026	0.0078	0.026
Amount	-0.0204	0.034	-0.0474	0.031
Mobility1	-0.0586	0.095	-0.0971	0.070
Mobility2	0.0386	0.041	-0.1060 ***	0.036
Number health	-0.0167	0.011	0.0053	0.009
Health1	0.0173	0.038	-0.0011	0.030
Health2	-0.0056	0.051	-0.0882	0.057
Health3	0.0087	0.036	-0.0244	0.027
Health4	-0.0850	0.063	-0.0944 *	0.054
White	0.0732	0.055	-0.0350	0.046
Single	-0.0318	0.043	0.0027	0.034
Married	0.0255	0.034	-0.0387	0.027
Qual1	0.3425 ***	0.048	0.2880 ***	0.049
Qual2	0.1424 ***	0.051	0.2259 ***	0.046
Qual3	0.0688 *	0.039	0.0750 *	0.041
Qual4	0.1017 **	0.042	0.0410	0.036
Qual5	0.0017	0.042	-0.0213	0.037
Occ2	-0.0091	0.039	0.1257 ***	0.049
Occ3	-0.1621 ***	0.038	-0.1220 ***	0.042
Occ4	-0.4078 ***	0.048	-0.3044 ***	0.039
Occ5	-0.4130 ***	0.038	-0.5191 ***	0.077
Occ6	-0.5494 ***	0.070	-0.4822 ***	0.045
Occ7	-0.4283 ***	0.062	-0.4068 ***	0.047
Occ8	-0.5297 ***	0.039	-0.4934 ***	0.067
Occ9	-0.5993 ***	0.041	-0.5382 ***	0.046
Ind1	0.0190	0.107	0.2619 **	0.122
Ind2	0.3527 ***	0.090	0.5770 ***	0.170
Ind3	0.2187 ***	0.056	0.1253 **	0.056
Ind4	0.2597 ***	0.064	0.2197 **	0.092
Ind5	0.0970 *	0.058	-0.0342	0.049
Ind6	0.2341 ***	0.060	0.1174 *	0.062
Ind7	0.2777 ***	0.057	0.1565 ***	0.049
Ind8	0.1341 **	0.057	0.0021	0.046
Part	-0.0329	0.043	-0.0429 *	0.022

Public	-0.0029	0.038	0.1144***	0.028
Small firm	-0.1132***	0.023	-0.0816***	0.021
Temporary	0.0115	0.055	0.0471	0.042
Social housing	-0.1429***	0.052	-0.0745*	0.043
Owned	-0.0321	0.047	-0.0565	0.043
Mortgaged	-0.0050	0.042	-0.0114	0.038
Lambda	-0.0124	0.055	-0.0300	0.046
Observations	1557		1540	
Chi Sq	1911.62 (0.00)		2080.81 (0.00)	

Notes to table: See notes to Table 3.

Appendix Variable definitions

Dependent variables	
Employ	Dummy variable, equals 1 if employed, 0 if unemployed or inactive
Log(hourpay)	Log of hourly pay (gross weekly pay divide by usual hours)
Human capital variables: Dummy variables equal 1 if highest qualification is	
Qual 1	University degree or higher degree
Qual 2	Other higher education
Qual 3	A Level
Qual 4	O level
Qual 5	Other qualification
Qual 6	No qualifications (base)
Industry variables: Dummy variables equal 1 if employed in	
Ind1	Agriculture and fishing
Ind2	Energy and Water
Ind3	Manufacturing
Ind4	Construction
Ind5	Distribution, hotels etc
Ind6	Transport communication etc
Ind7	Banking and finance
Ind8	Public administration
Ind 9, 10	Other (base) (includes other services)
Occupation variables: Dummy variables equal 1 if employed in	
Occ 1	Managers and senior officials (base)
Occ 2	Professional occupations
Occ 3	Associate professional and technical
Occ 4	Administrative and secretarial
Occ 5	Skilled trades
Occ 6	Personal service occupations
Occ 7	Sales and customer service occupations
Occ 8	Process, plant and machine operatives
Occ 9	Elementary occupations
Health variables: Dummy variables equal 1 if main type of health problem relates to	
Health1	Limbs (includes arms and hands, legs and feet and back and neck)
Health2	Sight and hearing (sight, hearing and speech)
Health3	Skin, chest, breathing, blood, heart stomach,
Health4	Mental illness (includes depression, bad nerves, learning difficulties, phobia, panics or other nervous disorders).
Health5	Other (includes progressive illness, epilepsy) (base)
	Dummy variables equal 1 if health problem has lasted
Duration1	Less than a year
Duration2	At least a year but less than 2 years
Duration3	At least 2 years but less than 3 years
Duration4	At least 3 years but less than 5 years

Duration5	At least 5 years but less than 10 years
Duration6	10 years or more (base)
Number health	Number of separately recorded different types of health problem
Kind	Dummy variable, equals 1 if health problem affects kind of work can do, 0 otherwise
Amount	Dummy variable, equals 1 if health problem affects amount of work can do, 0 otherwise
Mobility1	Dummy variable, equals 1 if health problem greatly affects getting to work, 0 otherwise
Mobility2	Dummy variable, equals 1 if health problem affects getting to work to some extent, 0 otherwise
Sheltered	Dummy variable, equals 1 if working in sheltered employment, 0 otherwise
Assistance[26]	Dummy variable, equals 1 if need and received assistance to help work, 0 otherwise
Incapacity Benefits	Dummy variable, equals 1 if incapacity benefit claimant, 0 otherwise
Other Sickness[27]	Dummy variable, equals 1 if claim any sickness or disability benefit other than incapacity benefit, 0 otherwise
Ageon[28]	Variable indicating the age of onset of current disability. Created as age-duration. A continuous measure of duration is constructed from the midpoint of the responses unless duration is more than 10 years where duration is (age+10)/2. When the cause of the disability is stated to be at birth duration is set equal to age.
Housing status variables: dummy variable equals 1 if	
Social	Renting from non-private sector
Owned	Home owned outright
Mortgaged	Home mortgaged
Private rent	None of the above (base)
Other variables	
Age	Age in years.
Experience	Age minus school leaving age.
Tenure	Length of time in current job in months.
Single	Dummy variable denoting marital status, equals 1 if single and never married
Married	Dummy variable denoting marital status, equals 1 if married
Child 19	Number of dependent children in household if head of household or spouse, 0 otherwise
Child 2	Number of dependent children in household aged less than 2 if

[26] This question is only asked to those who state they have problems with the kind, amount or getting to work. It is assumed that the disabled who are not asked this question do not have any form of assistance.

[27] This includes Severe Disablement Allowance, Mobility Allowance, Statutory Sick Pay, Invalid Care Allowance, Disability Working Allowance/Disabled Persons Tax Credit, Disability Living Allowance, Attendance Allowance, Industrial Injury Disablement Benefit.

[28] The sensitivity of the results to the construction of the age of onset is tested. Using lower bounds rather than midpoints to construct duration does not affect the main results.

	head of household or spouse, 0 otherwise
Other earner	Dummy variable, equals 1 if there is another individual in household who is employed, 0 otherwise
White	Dummy variable denoting ethnic group, equals 1 if white, 0 otherwise
Employment type: Dummy variables equal to 1 if employed	
Small firm	In a workplace with less than 25 employees
Public	In the public sector
Part	On a part-time basis
Temporary	On a non-permanent employment