Interpreting Wage Gaps of Disabled Men: The Roles of Productivity and Discrimination

Simonetta Longhi
Cheti Nicoletti
Lucinda Platt

Institute for Social and Economic Research
University of Essex

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& ECONOMIC RESEARCH

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NON-TECHNICAL SUMMARY

In this paper we study wage gaps for disabled men after the introduction of the Disability Discrimination Act (DDA) using the UK Labour Force Survey. The DDA defines disability in terms of long-term health conditions which limit daily activity. We measure wage gaps separately for "disabled people" and for those with a long-term health condition that does not limit daily activity, "long term ill people". Given previous evidence on negative attitudes towards people with mental illness, we also distinguish between mental and physical illness.

To check whether the wage gap is related to reduced productivity that might be associated with a long-term health condition, we identify the subgroup of disabled (and long term ill people) who do not have limitations on the amount or kind of work they do, do not have more than one health condition, and did not have any sickness absence. We then check whether the wage gap of this restricted group is still significant.

We find that disabled and long term ill workers are paid significantly less than non-disabled workers but this is in part due to reduced productivity and to differences in work-related characteristics such as education and type of occupation. In particular, for long term physically ill, physically disabled and long term mentally ill workers, we find that the pay gap becomes insignificant once we control for differences in productivity and in work-related characteristics. By contrast, mentally disabled people with no reduced productivity are still paid significantly less than non-disabled people. Their wage gap is in part explained by concentration in lower paying occupations but it would seem that they also experience discrimination.

In conclusion, disabled people face major wage gaps attributable to relatively disadvantaging work-related characteristics as well as to productivity differences; and addressing the education and occupational sorting of disabled people therefore remains a challenge. Moreover, for the most stigmatized group, mentally disabled people, wage discrimination remains a live issue.

Interpreting Wage Gaps of Disabled Men: The roles of productivity and of discrimination

Simonetta Longhi, Cheti Nicoletti[*] and Lucinda Platt

Institute for Social and Economic Research, University of Essex

Wivenhoe Park, CO4 3 SQ Colchester

Abstract: Using the UK Labour Force Survey, we study wage gaps for disabled men after the introduction of the Disability Discrimination Act. We estimate wage gaps at the mean and at different quantiles of the wage distribution, and decompose them into the part explained by differences in workers' and job characteristics, the part that can be ascribed to health-related reduced productivity, and a residual part which we can more confidently interpret as discrimination. For physically disabled workers, most of the wage gap can be attributed to differences in productivity, while for mentally disabled people we find evidence of wage discrimination.

Keywords: wage gap, discrimination, disability, Oaxaca decomposition.

JEL Classification: J7, J14, J31, C21.

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[*] Corresponding author: nicolet@essex.ac.uk

1. Introduction

The reduction of labor market discrimination against people with disabilities is one of the main targets of the Disability Discrimination Act (DDA) passed in the UK in 1995. The DDA defines disability in terms of long-term health conditions which limit daily activity. We measure wage gaps after the introduction of the DDA, both for disabled people, and for those with a long-term health condition that does not limit daily activity and who are therefore not covered by the Act. We estimate the part of the wage gap which can be ascribed to differences in characteristics between disabled and non-disabled workers, and a residual wage gap.

Residual wage gaps are typically attributed to discrimination. When analyzing the contribution of discrimination to disabled people's wage gaps, however, researchers are faced with the fact that the source of discrimination – the disability – may also be the cause of differences in productivity. For example, those with long term health conditions may need more time off from work, be less able to work for continuous periods of time, or have more difficulty with specific employment related tasks, which render them less productive than workers without such a long-term health condition doing a comparable job. To establish the contribution of workplace discrimination to disabled people's wages it is therefore important to distinguish that part of the residual which is attributable to productivity differences.

To decompose the residual wage gap into the parts related to reduced productivity and discrimination, we build on the approach of DeLeire (2001), focusing on men, but applying our method to the UK. DeLeire (2001) considers people with functional limitations, and compares the wages of those who do not regard their impairment as affecting their work with those who do. The residual wage gap between these two groups is interpreted in terms of productivity, while the residual gap between people with functional limitations not affecting their work and non disabled people is interpreted as discrimination. This interpretation relies on two strong assumptions. The first is that people with functional limitations who think that their condition is not work-limiting are as productive as non disabled ones; while the second is that discrimination does not differ between people with functional limitations according to whether their disability does or does not affect their work, or, more generally, between different levels or types of disability. In fact, an extensive literature suggests that people with serious mental health problems experience substantial labor market disadvantage compared to non disabled people and

to disabled people whose health problem is a physical one (see Baldwin and Johnson 2006); and there is some evidence that discrimination increases with severity of impairment.

Using the UK Labour Force Survey (LFS) we are able to weaken these two assumptions and provide a more robust account of disabled men's wage gaps. We take advantage of the fact that, following the introduction of the DDA, a recommended suite of questions aimed at providing an appropriate basis to measure disability was developed and has been included in the LFS since 1997 (Smith and Keyte 2008). We define different levels of severity of the disability and control for differences in productivity by combining subjective and objective measures of reduced work productivity.

To decompose the wage gap we adopt a novel technique proposed by Firpo et al. (2007), based on a combination of weighting and regression approaches. This technique allows us to overcome some of the drawbacks of the Oaxaca-Blinder decomposition adopted by previous papers on disability wage gaps. We provide for the first time a detailed decomposition of the disability wage gap at the mean and at different percentiles of the wage distribution to identify potential differences in the impact of discrimination at different wage levels.

We find a residual unexplained wage gap, which we can more confidently interpret as discrimination, only for disabled men with a mental health condition. This gap is concentrated at the top of the wage distribution. Overcoming the large obstacles to being in work in the first place that are faced by this group of men with mental health problems does not seem to be sufficient to ensure equal treatment within the workplace, even if they are as productive as their non-disabled peers.

2. Background and previous literature

There is substantial evidence that disabled people are paid on average less then non disabled people (Baldwin and Johnson 1994; Baldwin and Johnson 1995; Baldwin and Johnson 2000; DeLeire 2000; DeLeire 2001; Johnson and Lambrinos 1985; Jones et al. 2006c; Kidd et al. 2000), but there are different potential reasons why this may be the case. First, disabled people could be discriminated in the labor market as in other areas of life because of low social acceptance and prejudice against disability. Studies of attitudes toward different types of disabilities have found high intolerance of people with mental illness across a range of

populations and ages, whereas conditions such as asthma, diabetes and heart problems have a much higher level of acceptance (Rigg 2007; Royal and Roberts 1987; Westbrook et al. 1993). Second, impairments can limit work productivity, increase sickness leave or disability related absences from work, which can ultimately lead to reduced wages. Third, disabled people may differ from non disabled people in terms of level of education, occupation and other personal and job characteristics which are rewarded in the labor market. The composition of the disabled population by age, education and occupation is quite different from that of non disabled people: disabled people tend to be older, less educated and work in low paid occupations.

A number or studies have adopted the Oaxaca-Blinder decomposition approach to distinguish the part of the wage gap related to differences in personal and job characteristics, the part related to differences in productivity, and a residual part attributed to discrimination (Baldwin and Johnson 1994; Baldwin and Johnson 1995; Baldwin and Johnson 2000; DeLeire 2001; Johnson and Lambrinos 1985; Jones et al. 2006c; Kidd et al. 2000).[1] These papers are all faced with the twin issues of how to define disability and how to account for health-related productivity differences among those categorized as disabled. We briefly review here the solutions that these studies suggest for these issues and emphasize some limitations before describing our contribution.

Johnson and Lambrinos (1985) were the first to carry out a decomposition analysis of the wage gap between disabled and non disabled people, using the 1971 Social Security Survey of Disabled and Non Disabled Adults in the USA. They define disability in terms of impairments which are visible and likely to be more subject to prejudice, that is, impairments which either visibly affect body movement, or impact on speaking, or are deforming. They control for productivity by using a measure based on the number of impairments and their severity. As they are not evaluating anti-discrimination policy, they adopt a definition of disability that prioritizes conditions deemed to be evident and liable to discrimination. Their productivity measure incorporates severity measures which are likely to impact on productivity, though may also increase discrimination, but does not capture respondents' own perceptions of the impact of their impairment on their work.

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[1] We focus here only on papers which have adopted decomposition methods to explain differences in pay between disabled and non-disabled people. For a more complete review of disability pay and employment gaps we refer to Baldwin and Johnson (2006). Papers on employment discrimination against disabled people published after Baldwin and Johnson's review include Jones (2006a) and Bell and Heitmueller (2009), and both of them refer to the UK.

Baldwin and Johnson (1994 and 1995) use the 1984 Survey of Income and Program Participation (SIPP) in the USA to study discrimination for men and women separately. They consider two types of disability: impairments more subject to prejudice and impairments less subject to prejudice, and employ factor analysis to summarize 12 measures of workers' functional capacities to control for differences in productivity. Baldwin and Johnson (2000) update their previous work using the 1990 SIPP. They use the same definition of disability and control for productivity differences by means of dummy variables to capture whether an individual has difficulty with, or is unable to perform each of 14 functional activities. They also employ an alternative measure of productivity using factor analysis and summarizing the functional limitations variables in the three main factors. Since all respondents (disabled and not) are asked to report information on each functional activity, all three studies are able to include these productivity measures as explanatory variables in the wage equations for disabled and non disabled people. Although a valuable contribution, this approach does not consider that some functional limitations may reduce productivity in some types of occupations and jobs, but may be completely irrelevant in others.

DeLeire (2001), who also uses the SIPP, defines as disabled those people with functional limitations, and controls for productivity by comparing people with and without work limitations. The presence of work limitations is directly reported by the worker and it is probably a better way to control for reduced productivity. DeLeire also employs a subjective five-point measure of health as an explanatory variable in the wage equations. However, this is not a good way to control for health-related productivity differences because there are known to be substantial differences in the way people perceive their health and in the way they use the five-point scale to report it (Bound 1991; Groot 2000; Jürges 2008). Even if health was a perfect measure, it would be incorrect to attribute the difference in mean health to productivity, and the difference in the health coefficient of the wage equations to discrimination. This is because a different health coefficient for disabled and non disabled people could reflect the fact that bad health has a bigger impact on productivity for disabled people.

Kidd et al. (2000) analyze the disability wage gap in the UK using the LFS for 1996, that is, after the enactment but before the implementation of the DDA. At this date, measures that reflect the DDA definition were not yet incorporated into the LFS. Kidd et al. define disabled people as individuals with long term health problems and control for productivity differences by

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considering whether people had any period of sickness and its length. While sickness absence may in general be a reasonable proxy for health-related reductions in productivity, in this study it is only measured for a specific week; moreover the authors' definition of disability is very broad.

Again using the UK LFS but following an approach more in line with DeLeire (2001), Jones et al. (2006) examine changes in the disability wage gap before and after the introduction of the DDA. Their main issue is to harmonize the measure of disability before and after spring 1997, when the LFS questions on disability changed. To avoid this problem they compare the disability wage gap in 1997, shortly after the implementation of the DDA, and in 2003. Assuming that the full implementation of the DDA required more than one year, they attribute differences in the disability wage gap between 1997 and 2003 to the introduction of the DDA. They define disability as long term illness; this is broader than the definition adopted by the DDA where disability is defined as long term illness that limits daily activities and thus their 'disabled' group cannot fully be deemed to be covered by the Act. To identify productivity differences they distinguish between those disabled people who regard their health condition as work limiting and those who do not. Similarly to DeLeire (2001), the residual wage gap comparing disabled people without work limitations and non-disabled people is interpreted as discrimination and the difference in this residual wage gap and the one observed between disabled people with work limitations and non disabled people is interpreted as productivity differences. They find a small contribution of discrimination to the wage gap and a rather larger role played by productivity differences.

3. Measuring discrimination and productivity

We build on the approach of DeLeire (2001) and its implementation in the UK context by Jones et al. (2006) to analyze the disability wage gap in the UK, concentrating on the period after the introduction of the DDA. According to the DDA, a disabled person is someone who 'has a physical or mental impairment which has a substantial and long-term adverse effect on his ability to carry out normal day-to-day activities' (Part 1, paragraph 1). Long-term refers to a condition which has lasted or can be expected to last for more than one year. LFS questions on long-term health conditions and their impact on 'day-to-day' activities enable us to define disability in line with the Act. Furthermore, we can separately ascertain the extent to which people with long-term

health problems that do not impact on day-to-day activities (who are not covered by the Act) face wage discrimination. We define these two groups with long-term conditions that do or do not affect daily activities as 'disabled' and 'long term ill' respectively. The comparison between disabled and long term ill men is interesting for two reasons. First, it is relevant to ascertain if those who are long term ill experience discrimination, since that would indicate the DDA is not appropriately targeted. Secondly, the fact that their long term illness does not restrict their daily activity implies that this is a group where the condition is less severe. Therefore, these are two groups whose experience of health problems is likely to be qualitatively different, and by separating them we do not have to assume a constant experience of discrimination across those in the two groups. We are able to relax DeLeire's (2001) assumption of constant discrimination by separating groups also according to the experience of the long-term health condition (whether it affects the amount or the type of work that can be carried out) and according to the type of condition (mental versus physical). The comparison between mental and physical disability is important since these different types of disabilities are associated with different levels of activity limitations and social acceptance (Baldwin and Johnson 2000).

To better account for health-related impacts on productivity we combine measures of self-reported productivity and objective measures of severity and productivity: the presence of co-morbidities and sickness absence. Those with no sickness absence can be deemed less subject to the impact of their health condition on their productivity than those obliged to take at least some time off for health reasons. The inclusion of these more objective measures of severity and productivity also enables us to weaken DeLeire's (2001) assumption that people with functional limitations who think that their condition is not work-limiting are as productive as non disabled people. Our assumption is, instead, that only those disabled people who have *neither* limitations on the amount *nor* on the kind of work they do, *nor* co-morbidities *nor* sickness absences can be considered as productive as non disabled people.

By comparing disabled people with no health related productivity constraints with non disabled people, we measure the part of the wage gap associated with discrimination by the unexplained or residual wage gap; while comparison of this residual wage gap with the one observed between those with various types of health-related productivity limitations and non disabled people provides us with a measure of the contribution of productivity differences to the wage gap. This comparison approach is similar to DeLeire (2001), but we relax the assumption

that discrimination does not change across people with different levels and type of disability by carrying out this comparison separately across four, mutually exclusive, groups: physically long-term ill, physically disabled, mentally long term ill and mentally disabled. For each of these four groups we sequentially apply restrictions to better identify those whose condition does not affect work productivity. We first restrict them to those who think that their condition does not limit the *amount* of work that they can do; we then further restrict the group to those who also say that their condition does not limit the *kind* of work they can do. The third additional restriction is that of no co-morbidities, that is, we exclude all those who have more than one health condition. The final additional restriction excludes all those people who had any days of sickness leave in any of up to five reference weeks. In each case, we compare them with the reference group of non-disabled.

Although the exact sequence of restrictions might appear arbitrary, the size of wage gaps across the different restrictions is nonetheless informative, and the order does not affect the final results, since our focus is on the comparison between the least and the most restricted group (where we can be most sure that any residual wage gap represents discrimination), and where the comparison of residual gaps can tell us about the contribution of productivity differences.

Finally, our new decomposition approach enables us to identify whether discrimination is more of an issue among the better or the worse paid, which is potentially informative about the operation of discrimination in employment. Before describing the decomposition method, below we give more details on the LFS data.

4. The UK Labour Force Survey

The empirical analysis is based on pooled quarters of the LFS for the UK from the second quarter of 1997 to the fourth quarter of 2008. The LFS is a survey of households, conducted quarterly by the Office for National Statistics (ONS); it is representative of the whole population of the UK and covers not only people resident in private households, but also residents in National Health Service accommodation, and young people living in student halls or similar institutions. The LFS is a rotating panel, in which respondents are interviewed for up to five successive quarters. In each calendar quarter approximately one fifth of the sample will be responding for the first, second, third, fourth or fifth time. Wages are calculated as hourly

earnings for those in employment, are based on usual hours, but include paid overtime, and exclude those who are self-employed. We deflate hourly wages to prices at the 1st quarter of 2008 using the consumer price index (CPI, from www.statistics.gov.uk). Earnings questions are asked in the first and fifth interviews; we select respondents at their first interviews only, resulting in unique observations for any individual. We measure wages in logs so that wage gaps are approximately equal to relative rather than the absolute changes in wage.

To minimize any potential confounding effects of differential responses by ethnic group or country of birth (Chatterji et al. 2007), and to exclude those who have not yet completed their education, we focus only on men aged 23-64 who are White and UK-born.

The set of disability questions allows us to identify people who are physically long-term ill, physically disabled, mentally long term ill and mentally disabled; whether their condition affects the amount and/or the kind of work they can do; whether they have co-morbidities, and whether they had any days of sickness leave in up to any of five reference weeks.

We compute three qualification dummies following the National Vocational Qualification classification (NVQ): (1) NVQ 4 or above, which includes higher, first, and other degrees; (2) NVQ 3 which includes qualifications from post compulsory schooling, but lower than degree level; (3) NVQ 2 or less, which includes all other qualifications, and is used as reference category. We also include dummies for occupations (SOC). The span of our disability analysis includes a change in occupational coding. Since harmonization is not possible, we include dummies for both the SOC90 and the SOC2000 categories, using the higher professional and managerial from both as the reference category as the most consistent across the series break. A part-time dummy is defined for those working fewer than 30 hours per week. Job tenure is also included as a dummy variable for those with five or more years in the job. This categorical division maximizes the overlap between the groups. We also compute one dummy for those working in small firms; a dummy for privately rented accommodation, and one for local authority housing.

Finally, there is also substantial regional variation in those who claim disability benefits in both the US and the UK (McVicar 2006; Rosato and O'Reilly 2006): in areas of higher employment, disabled people are more likely to be in work and to receive higher wages; in areas of deindustrialization and mass unemployment, lack of employment has itself been regarded as contributing to higher rates of long-term mental illness (Jones et al. 2006b). We include

dummies for the nine Government Office Regions of England plus Wales, Scotland and Northern Ireland, since the relationship between disability and labor market outcomes has been shown to vary by region (Jones et al. 2006b).

The dataset provides 'person weights' that aim to render the sample as a whole representative of the population of the UK, taking account of both response and design effects. We use weights for the descriptive statistics, and adjust hourly wages by income weights in all the analysis. For more details on sample and survey methodology see the LFS User Guide, Vol. 1.

5. Method for the decomposition of the wage gap

We decompose disability wage gaps using the method recently proposed by Firpo et al. (2007), which allows a detailed decomposition at the mean and at different percentiles of the wage distribution.

Firpo et al.'s method combines the use of weights to equalize the empirical distributions of the explanatory variables between the two subpopulations compared (DiNardo et al. 1996) and of 'recentered influence function' regressions (Firpo et al. 2009). The use of the recentered influence function approach enables an extension of the Oaxaca-Blinder decomposition (Blinder 1973; Oaxaca 1973) from linear regression models to quantile regressions; whereas the use of weights enables us to relax the linearity assumptions imposed by regression models adopted in the Oaxaca-Blinder and the recentered influence function approaches. Thus the combined method overcomes both the disadvantages associated with the Oaxaca-Blinder decomposition approach (the focus solely on the mean of the distribution and linearity assumptions potentially leading to out of sample predictions (Barsky et al. 2002)) and those associated with the weighting approach (the inability to provide a detailed decomposition of the contribution of characteristics to wage gaps either at the mean or at other parts of the distribution).

The weighting technique involves estimating a model for the probability of being disabled rather than non disabled using a set of explanatory variables. We use a logit model to predict disability, and employ its predictions to compute weights given by the ratio between the probability of being non disabled and the probability of disability. This makes it possible to compute the weighted mean and quantiles of log wages for the disabled group. These weighted

statistics are the counterfactual mean and quantiles of log wages for the disabled group as if it had the same distribution of characteristics of the non disabled group. Such a weighting approach allows us to decompose the mean (or quantile) wage gap between disabled and non disabled into an 'explained' part attributable to differences in characteristics between the two groups, calculated as the difference between the mean wage for the disabled group and its counterfactual mean, and an 'unexplained' part, calculated as the difference between the counterfactual mean and the mean wage for the non disabled group. The main advantages of weighting methods are that they require specifying and estimating a model only for the probability of being disabled; their main drawback is that they do not provide a detailed decomposition of the contribution of specific characteristics to the wage gap.

Firpo et al. (2007) show how to generalize the Oaxaca-Blinder decomposition of the mean gap to quantiles, variance and other summary statistics by using the recentered influence function (RIF) approach. The RIF for a statistic (for example a quantile) is a transformation of the outcome variable, in our case log wages, such that its mean equals the actual statistic (see Firpo et al. 2009 for more details of the RIF and its properties). By assuming a linear relationship between the RIF and the explanatory variables, we can then use the Oaxaca-Blinder decomposition to explain differences in quantiles. However, the estimation of the counterfactual in this approach is still based on a linearity assumption and possibly on out of the sample predictions.

To overcome this limit, we estimate the weighted linear regression of the RIF for the disabled group by using weights as described above. This estimation is consistent if *either* the weights (i.e. the logit model) are correctly estimated *or* the linear regression model is correctly specified. The counterfactual mean or quantile are computed as in the Oaxaca-Blinder decomposition but considering the coefficients estimated using the weighted regression (RIF) model instead of the simple mean regression model. From comparing the counterfactual with the quantile wage of non disabled men, we can again decompose the wage gap into the part explained by differences in the distribution of explanatory variables and the residual 'unexplained' part. We can further compare the explained component based on the regression (generalized Oaxaca) approach with the explained component in the combined weighting and regression based approaches. The similarity of these two components tells us how close the generalized Oaxaca decomposition of the wage gap is to the amount explained according to our

double-robust counterfactual, and thus the confidence with which we can use the detailed results for the contribution of different characteristics deriving from the generalized Oaxaca decomposition (see Firpo et al. 2007 for more details).

As Firpo et al. (2007) note, the approach requires the assumption of common support (i.e. the predicted probability of disability must have a common range for disable and non-disabled people). It can also be sensitive to the choice of reference population. In our application the support for the predicted probabilities is almost identical, and when we repeated the analysis on a restricted sample which enforced the common support restriction we obtained very similar results. Given our focus on the comparison of a sequence of disabled groups with a single reference population, our logical reference group is the population of non disabled men. However, our results are robust to the use of the combined population of non disabled and of people with long term illness as the reference group.[2]

In the wage models we include job tenure, age and its square, and dummies for: qualification, occupation, whether work is part-time rather than full-time, having a public rather than private sector job, firm size, region and calendar year. In addition, in the logit models we include a number of other variables that distinguish between disabled and comparison groups. These are: dummies for being married or cohabiting, presence of dependent children aged under 5 and aged 5-15, and housing tenure.

6. Empirical analysis

6.1. Descriptive statistics

The disability groups, their sample sizes, and their proportions are summarized in Table 1. The table shows how the proportion of men with productivity apparently equal to the non disabled varies by group. This proportion is higher among those who do not see their health condition as activity limiting, and substantially higher among those with physical compared to mental health problems. We should note that this latter group are men who have already overcome substantial barriers to get into or stay in employment and indicates the difficulties of combining sustained paid work with a mental health problem. Nevertheless, we still find around one fifth of each of the disabled groups who appear to have no health related productivity constraints.

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[2] Detailed results are available from the authors upon request.

Table 1: Definition of disability

Disability Group	Observations	Percent of sample	Percent of group
Non disabled	94685	78.4	100
1 Long term physically ill	16601	13.7	100
1a) 1 + does not affect amount of work	14251	11.8	86
1b) 1a + does not affect kind of work	11991	9.9	72
1c) 1b + no other conditions	9605	7.9	58
1d) 1c + no days of sickness leave	7883	6.5	47
2) Physically disabled	8418	7.0	100
2a) 2 + does not affect amount of work	4877	4.0	58
2b) 2a + does not affect kind of work	3547	2.9	42
2c) 2b + no other conditions	2269	1.9	27
2d) 2c + no days of sickness leave	1856	1.5	22
3) Long term mentally ill	509	0.4	100
3a) 3 + does not affect amount of work	392	0.3	77
3b) 3a + does not affect kind of work	305	0.3	60
3c) 3b + no other conditions	247	0.2	49
3d) 3c + no days of sickness leave	195	0.2	38
4) Mentally disabled	622	0.5	100
4a) 4 + does not affect amount of work	303	0.3	49
4b) 4a + does not affect kind of work	199	0.2	32
4c) 4b + no other conditions	127	0.1	20
4d) 4c + no days of sickness leave	105	0.1	17

The proportions of the different groups are not representative of the distribution of conditions across the population but only among those in paid work. This is a consequence of differential employment rates (excluding self-employment), ranging from 75 percent[3] for non disabled men aged 23 to 64, to 16 percent for mentally disabled men, with physically disabled men having employment rates of 37 percent. Long term physically ill men have employment rates of 69 percent, while long term mentally ill men in this age range have employment rates of 52 percent. Our samples, particularly of mentally disabled men, are, then, already highly selected; and yet within that we still see substantial variation in terms of constraints on employment.

Descriptive statistics of the estimation sample are shown separately for non disabled men, those with a physical condition (separating physically disabled and long term physically ill), and

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[3] This figure may appear low, but an additional 16 percent are self-employed, giving a 91 percent labour market participation rate for non-disabled men in this age range.

those with a mental condition (separating mentally disabled and long term mentally ill) in Table 2. The table reveals the absolute differences in average wage for each group which follows a gradient influenced by both severity and type. However, the groups are also distinctive in other ways.

Consistent with previous research, qualifications tend to be lower on average among those with health conditions, though those with mental conditions seem to be slightly better educated than those with physical conditions. We could assume that in most cases the onset of disability succeeded the completion of education, so that what we see is that the less-well educated are more susceptible to health problems. However, Hollenbeck and Kimmel (2008) argue that disability can itself influence educational decisions and options. Those who become disabled after their early 20s are less likely to have completed school or acquired qualifications than those who do not become disabled, but they are still more likely to have higher qualifications than those who experienced early onset or were born with a disability (Jenkins and Rigg 2004; Loprest and Maag 2003). However, Berthoud's (2006) findings suggest that completing education relatively early is associated with greater chance of onset of disability.

Those with a health problem have higher rates of part-time employment, which itself tends to attract lower wages than full-time work. Jones (2007) has suggested that part-time work offers a means for disabled people to participate in employment in a way that accommodates them more effectively. Thus, given the major wage deficit associated with part-time jobs (Manning and Petrongolo 2008), greater access to employment by these means might actually serve to increase disabled people's wage gaps.

Those with health conditions are less likely to be in professional or managerial occupations; and this is particularly the case for those with mental health conditions. This occupational distribution will go some way towards accounting for wage differentials. It may be that more 'accommodating' occupations are also those that are less well paid, so that participation comes at a cost. Wages also vary according to region, and we also see some regional variation in the proportion of people with health conditions.

Table 2: Descriptive statistics of the estimation samples

	Non Disabled	Long term physically ill	Physically disabled	Long term mentally ill	Mentally disabled
Observations	94685	16601	8418	509	622
Mean wage (£)	12.92	12.20	11.27	11.28	9.71
Mean age	41	45	47	41	42
Working part-time (Ref: full-time)	3.7	5.7	8.4	8.8	15.9
Public sector (Ref: private)	21.2	21.5	21.7	24.0	28.0
Job tenure > 5 years	58.1	61.2	62.3	51.7	57.4
Qualification Level 4 or more	33.0	27.3	22.3	31.0	27.5
Qualification Level 3	22.2	21.6	20.1	17.5	16.1
Qualification Level 2 or less	44.8	51.1	57.6	51.5	56.4
Firm size: 0-50	40.2	42.0	43.6	42.4	44.1
Firm size: 50+	59.8	58.0	56.4	57.6	55.9
Occupation - pre 2001	0.0	0.0	0.0	0.0	0.0
Managers & administrators	8.6	6.7	5.3	4.5	4.2
Professional occupations	5.2	3.6	2.8	4.3	2.3
Associate prof & tech	3.9	3.1	2.3	4.7	2.9
Clerical, secretarial	2.8	2.6	2.6	4.1	2.9
Craft and related	7.2	6.4	5.6	3.3	3.1
Personal, protective occupations	2.8	2.2	2.4	2.2	2.9
Sales	1.6	1.3	1.3	1.6	1.1
Plant and machine operatives	6.1	5.8	6.1	5.5	4.0
Other occupations	2.5	2.5	2.5	3.5	4.0
Occupations- 2001 onwards					
Managers and senior officials	13.2	13.2	11.7	10.0	8.5
Professional occupations	8.9	8.6	7.6	9.8	8.4
Associate professional and technical	8.9	8.4	8.6	7.9	7.9
Administrative & secretarial	2.8	3.4	4.0	6.5	8.2
Skilled trades occupations	9.1	11.0	10.6	10.2	9.3
Personal service	1.3	1.8	2.4	3.1	2.6
Sales and customer service	1.7	1.9	2.1	3.5	6.1
Process, plant and machine operatives	7.8	9.8	12.4	5.1	6.4
Elementary occupations	5.7	7.5	9.8	10.0	15.3
Regions					
North East	5.6	6.3	7.3	6.7	5.9
Yorks and Humberside	9.3	11.3	10.2	10.6	9.8
East Midlands	7.9	8.7	8.3	7.3	9.5
East	3.7	4.0	3.2	5.1	2.9
London	7.1	5.6	5.3	7.9	5.8
South East	21.4	21.3	20.8	24.6	21.7
South West	9.2	9.6	9.9	8.1	9.6
West Midlands	9.2	9.2	9.4	9.0	8.2
North West	10.1	10.3	9.6	7.7	10.3
Wales	5.0	4.4	5.2	5.1	4.7
Scotland	10.2	8.5	9.9	7.5	10.6
Northern Ireland	1.4	0.8	0.8	0.6	1.0
With children aged 0-4	8.5	5.8	5.1	6.5	3.4
With children aged 5-15	30.5	26.0	24.8	26.5	24.0
Married or cohabiting	78.3	80.3	80.9	68.0	62.7

Health condition limits amount of work	N/A	14.0	41.9	23.0	51.2
Health condition limits kind of work	N/A	26.3	55.4	37.3	65.8

Men 23-64 for whom wage data are available. All variables are percentages, except age and wage

Table 2 also shows the extent to which those with long term illness or disability also experience it as limiting the amount or type of work they can do. As we might expect, a higher proportion of workers who are disabled compared to those who are long term ill regard their condition as limiting the amount or kind of work they can do. For both long term ill and disabled people there is a ten per cent higher chance of those with mental health conditions regarding their health problem as limiting the amount or kind of work they can do compared to those with physical conditions.

6.2. Generalized decomposition

Turning to the decompositions, we now investigate the extent to which these differences in characteristics account for the raw differences in wages, and the role of productivity differences in contributing to the wage gaps for people in work.[4]

Table 3 illustrates the decompositions of log wage gaps at the mean, while the quantile decompositions are shown in Table 4. The tables show the gap explained by the generalized Oaxaca ('Oaxaca – explained'), the explained component derived from the combined weighting and regression decomposition ('Explained'), and the part which remains unexplained. Where the two 'explained' components are close, we can be confident in using the generalized Oaxaca decompositions to explore which characteristics are contributing to the explained component of the wage gap. While, as expected, wage gaps are greater for disabled than for long term ill people, they are not negligible for the latter group, and are much larger for people with mental than people with physical disability. The wage gap of long term physically ill men (group 1) is five percent, while it is 14.1 percent for physically disabled men (group 2). In both cases, over half of the gap, amounting to 2.6 and 8 percent of reference group wages respectively, is unexplained. In the literature this residual gap is sometimes interpreted in terms of discrimination, and would thus suggest that discrimination on the grounds of physical disability

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[4] We also considered the issue of selection into employment, and in the Appendix we give some results for the potential wage gaps we would observe if all people in the active population were in work. However, as discussed in the Appendix, we prefer to analyze wage gaps only for those who are in paid employment.

amounts to a non-negligible difference in wages. In addition, the difference between the size of the residual gap for the two groups would suggest that discrimination increases with the severity of the condition. However, as we have already discussed, this inference of discrimination is too simplistic, and the unexplained part is likely to include productivity effects. When we restrict the minority groups by excluding those who say that their condition affects the type or amount of work they can do (i.e. they implicitly say they are on average less productive than non disabled people), then the gap reduces to 1.2 percent for long term physically ill, and to 1.8 percent for physically disabled men (groups 1b and 2b). Although in the first case the gap is still statistically significant at five percent, in the second case it is statistically significant only at the ten percent level, and the difference between the two groups has almost disappeared. At this point, characteristics play no role in accounting for the gap and the small differences are unexplained. The wage gap becomes statistically insignificant and approximates to zero when we further exclude people with co-morbidities and those who had days of sickness leave. This implies that the wage gap for physically disabled men is mostly due to differences in productivity, alongside some differences in characteristics. We can be more confident of this conclusion since, comparing physically disabled with long term physically ill men, there is little evidence of differential discrimination by severity, once we have taken account of productivity differences.[5] Instead, our results imply that productivity differences account for a wage gap of around two per cent for long term physically ill (the difference in the unexplained gap between groups 1d and 1) and around seven per cent for physically disabled men (the difference in the unexplained gap between groups 2d and 2).

The wage gap for long term mentally ill men (group 3) shows a very similar pattern to that of physically disabled men (group 2). The original size of the wage gap is very similar, and though for long term mentally ill men somewhat more is explained by differences in characteristics, the gap declines to zero once we limit the group to those with no subjective or objective productivity constraints, with neither unexplained nor explained components having a role.

The story is slightly different for mentally disabled men (group 4), who have an absolute wage gap of almost 30 per cent at the mean. As in the previous cases, the gap reduces

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[5] We might note though that physically disabled men who do not experience health related productivity constraints are slightly positively selected in terms of characteristics.

significantly (to 15 per cent) once we exclude people who say that their condition affects either the kind or amount of work they can do. However, the wage gap remains fairly constant and statistically significant (around 16 per cent) when we further exclude people with more than one condition, and those who had days of sickness leave. Almost all of the gap for this final group (4d) can be explained by differences in characteristics, and only two percent of the gap remains unexplained. Comparing this residual wage gap with the unexplained component for the whole group (group 4), suggests that productivity differences have the largest impact on wages for the mentally disabled, amounting to around 15 percent of wages. Not even for this highly stigmatized group is there strong evidence for discrimination on the basis of decomposition at the mean. Again, comparison between the mentally disabled and those with long term mental health problems gives little indication that discrimination increases with severity.

Table 3: Decomposition of the wage gap at the mean by disability group

Disability Group	Wage gap	Explained	Unexplained	Explained Oaxaca
1 Long term physically ill	-0.050*	-0.023	-0.026	-0.020
1a) 1 + does not affect amount of work	-0.030*	-0.010	-0.020	-0.008
1b) 1a + does not affect kind of work	-0.012*	0.001	-0.013	0.005
1c) 1b + no other conditions	-0.008	0.005	-0.012	0.007
1d) 1c + no days of sickness leave	0.003	0.000	0.003	0.005
2) Physically disabled	-0.141*	-0.061	-0.080	-0.058
2a) 2 + does not affect amount of work	-0.051*	-0.009	-0.042	-0.008
2b) 2a + does not affect kind of work	-0.018[+]	0.013	-0.031	0.012
2c) 2b + no other conditions	-0.003	0.021	-0.024	0.019
2d) 2c + no days of sickness leave	0.005	0.020	-0.014	0.024
3) Long term mentally ill	-0.131*	-0.084	-0.047	-0.076
3a) 3 + does not affect amount of work	-0.103*	-0.062	-0.041	-0.063
3b) 3a + does not affect kind of work	-0.067	-0.032	-0.034	-0.033
3c) 3b + no other conditions	-0.054	-0.021	-0.033	-0.017
3d) 3c + no days of sickness leave	-0.001	0.001	-0.002	-0.001
4) Mentally disabled	-0.297*	-0.130	-0.168	-0.093
4a) 4 + does not affect amount of work	-0.184*	-0.071	-0.113	-0.053
4b) 4a + does not affect kind of work	-0.151*	-0.044	-0.108	-0.051
4c) 4b + no other conditions	-0.166*	-0.062	-0.105	-0.052
4d) 4c + no days of sickness leave	-0.164*	-0.145	-0.019	-0.141

Wage gaps that are statistically significant at the 5% and 10% level are indicated with * and [+].

We now turn to Table 4, which shows the results of the decomposition over the wage distribution. In this table we do not show the interim stages and focus just on the four main groups (1-4) and their subpopulations who are not subject to health related productivity constraints (groups 1d-4d).[6]

The results of the decomposition at the quantiles mirror the decompositions at the mean. Again, the gaps are greater for disabled compared to long term ill men and for those with mental rather than physical conditions. There does not seem to be a clear pattern of increasing or decreasing gaps over the distribution for the different groups as a whole (groups 1-4). Looking at the results for people with physical conditions, the wage gaps are large and statistically significant for groups 1 and 2 which include people with productivity constraints while they decline almost to zero when we concentrate on those who experience neither subjective nor objective productivity constraints (groups 1d and 2d). The story is similar for those with long term mental illness, though for those without productivity restrictions (group 3d) the small sample size means that it would be hard to attain statistical significance for any of the gaps, once we are looking at specific quantiles, and the results tend to fluctuate across the distribution.

Again we find rather different results for mentally disabled men with no productivity constraints (group 4d), with some evidence that discrimination is important, at least at the top of the wage distribution. There are small and statistically insignificant wage gaps of 2.5 and 5.9 percent at the 10th and 25th percentiles, which appear to be fully accounted for by differences in characteristics. At the median there is a wage gap of 13 percent, which is statistically significant only at the 10 percent level and is largely explained by characteristics. The gaps, at the 75th and 90th percentiles however exceed 25 percent, and less than half of the gap is explained by characteristics. Though this subpopulation is not subject to productivity constraints, their experience at the higher end of the wage distribution is comparable with the group as a whole (group 4). Their wage gap stems both from a relatively disadvantaging distribution of characteristics and a substantial residual gap that we could infer is due to discrimination. Since this group differs from the less severely disabled (group 3d) the implication is also that at this point in the wage distribution discrimination is liable to increase with severity.

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[6] The full set of results are available on request.

Table 4: Decomposition across the wage distribution

Quantile	Wage gap	Explained	Unexpl	Explained Oaxaca	Wage gap	Explained	Unexpl	Explained Oaxaca
	1) Long term physically ill				3) Long term mentally ill			
P10	-0.042*	-0.011	-0.031	-0.006	-0.186*	-0.090	-0.096	-0.053
P25	-0.046*	-0.019	-0.027	-0.015	-0.137*	-0.039	-0.098	-0.064
P50	-0.057*	-0.034	-0.023	-0.029	-0.135*	-0.088	-0.047	-0.082
P75	-0.045*	-0.030	-0.016	-0.027	-0.128*	-0.076	-0.052	-0.065
P90	-0.054*	-0.027	-0.027	-0.023	-0.097*	-0.150	0.053	-0.075
	1d) 1 Long term physically ill with no health related productivity constraints				3d) Long term mentally ill with no health related productivity constraints			
P10	0.005	0.022	-0.017	0.025	-0.068	0.000	-0.067	-0.002
P25	-0.005	0.011	-0.016	0.017	-0.062	-0.041	-0.021	-0.009
P50	-0.001	-0.006	0.005	-0.001	-0.021	-0.073	0.052	-0.011
P75	0.015	-0.010	0.024	0.001	0.002	0.034	-0.033	0.026
P90	0.014	-0.023	0.037	-0.013	0.172	0.063	0.109	-0.067
	2) Physically disabled				4) Mentally disabled			
P10	-0.117*	-0.040	-0.077	-0.029	-0.223*	-0.078	-0.145	-0.049
P25	-0.125*	-0.066	-0.059	-0.065	-0.244*	-0.104	-0.140	-0.097
P50	-0.135*	-0.085	-0.050	-0.080	-0.294*	-0.151	-0.143	-0.106
P75	-0.137*	-0.062	-0.075	-0.065	-0.301*	-0.152	-0.149	-0.085
P90	-0.140*	-0.050	-0.089	-0.048	-0.242*	-0.154	-0.088	-0.087
	2d) Physically disabled with no health related productivity constraints				4d) Mentally disabled with no health related productivity constraints			
P10	0.003	0.013	-0.010	0.018	-0.025	-0.026	0.001	-0.084
P25	0.000	0.019	-0.020	0.016	-0.059	-0.054	-0.004	-0.034
P50	0.004	0.005	-0.001	0.012	-0.130+	-0.103	-0.027	-0.123
P75	0.011	0.020	-0.009	0.018	-0.283*	-0.127	-0.156	-0.171
P90	-0.007	0.022	-0.030	0.033	-0.261*	-0.101	-0.161	-0.193

Wage gaps that are statistically significant at the 5% and 10% level are indicated with * and [+].

6.3. Detailed decomposition

As we have seen, differences in the distribution of characteristics play a part in the wage gaps of our four broad groups. It is interesting to explore the contribution of characteristics across the groups to identify how wages might be made more equal even in the face of remaining productivity differences. However, for the present purposes we are more concerned to look at what characteristics matter when we have taken productivity differences out of consideration, since it gives a better understanding of how disabled people in work manage their disability through the types of work they participate in. As we have seen, characteristics cease to explain wage gaps for all the sub-populations who do not face productivity constraints, except for

mentally disabled men. We therefore examine the detailed decomposition for mentally disabled men who do not face productivity constraints (group 4d) to ascertain the contribution of specific characteristics to their wage gaps.

Table 5 summarizes the wage gaps and their explained and unexplained part at the mean and quantiles of the wage distribution for non-productivity restricted mentally disabled men. The explained part of the gap is decomposed into the contribution of the following groups of characteristics: occupation, education, age and job tenure, firm characteristics, part-time work, year and region. Firm characteristics include sector as well as firm size. We earlier noted that it is appropriate to employ the detailed results from the generalized Oaxaca when the explained components are similar to those for our double-robust counterfactual. For group 4d, the two explained components are very close at the mean, but at the quantiles the Oaxaca tends to overestimate the amount that can be explained. We should therefore be alert in what follows to the fact that the contribution of characteristics across the distribution, including at the top, may be overstated, while the unexplained residual gap might be underestimated.

The wage gaps which are statistically significant at 5 percent level are the mean, 75th and 90th percentiles. At the mean, the wage gap is 16.4 percent and 86 percent of it can be explained by characteristics. Similarly, at the 75th percentile characteristics explain 60 percent of the gap; while at the 90th percentile they explain 74 percent. By far the most important characteristic in explaining wage gaps is occupation. This might suggest that mentally disabled people (in group 4d) might self-select themselves in occupations that most suit their conditions and where they do not suffer a decrease in productivity. This implies that, as with Jones's (2007) argument relating to part-time work, there may be trade-offs between participating in the labor market at all, and participating without productivity deficits through concentration into lower paid occupations. However, we should not reject the possibility that since such occupations are clearly comparatively low-paying, it may be that discriminatory decisions of employers segregate disabled people into lower paid occupations and thus contribute to the disability wage gap.

Table 5: Detailed decomposition across the wage distribution: mentally disabled

	Mean	P10	P25	P50	P75	P90
Wage gap	-0.164	-0.025	-0.059	-0.130	-0.283	-0.261
Decomposition of the wage gap into						
Explained gap	-0.141	-0.084	-0.034	-0.123	-0.171	-0.193
Unexplained residual gap	-0.023	0.059	-0.025	-0.007	-0.113	-0.068
Decomposition of the explained wage gap into the combined contribution of						
Education	-0.028	-0.067	0.011	-0.036	-0.015	-0.027
Occupation	-0.118	0.028	-0.041	-0.118	-0.159	-0.199
Age & Job tenure	-0.006	-0.002	-0.014	-0.008	-0.007	-0.005
Firm characteristics	-0.008	-0.015	-0.021	-0.017	-0.012	0.003
Part-time	-0.007	-0.011	-0.008	-0.003	-0.007	-0.006
Year	0.027	-0.018	0.036	0.064	0.046	0.040
Region	0.000	0.001	0.003	-0.006	-0.015	0.000

7. Conclusions

In this paper we use the extensive data on disability and employment provided by the UK Labour Force Survey to study the wage gap for disabled men following the introduction of the Disability Discrimination Act (DDA). We refine our base definition of disability to adjust for the possibility that some disabled men might be less productive than non disabled men. By these means we can decompose the wage gaps into a part due to differences in characteristics, a part due to differences in productivity, and a residual unexplained part which can more confidently be attributed to discrimination.

We estimate wage gaps at the mean and at different quantiles of the wage distribution and find that most of the gap can be explained in terms of reduced productivity. We find little or no evidence of discrimination for physically disabled people, and little evidence that discrimination is associated with severity for those with physical health conditions; nor that the DDA is targeted in such a way that it does not cover those with long term health conditions at risk of wage discrimination. For long term physically ill, physically disabled, and long term mentally ill workers, effectively the whole of the unexplained part of the wage gap can be attributed to differences in productivity, and this is the case across the distribution of wages. For mentally disabled people, a wage gap persists among those who do not have reduced productivity,

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amounting to 16 percent at the mean and 26-28 percent at the 75th and 90th percentiles. This can in large part be accounted for by concentration in lower paying occupations. We can speculate that mentally disabled people might self-select into (lower paying) occupations that most suit their health conditions and where they do not suffer a decrease in productivity. In addition, there is a substantial unexplained component which can be attributed to discrimination for this group, and which is strongest at the top of the wage distribution: it is only 2.3 percent at the mean, but rises to a substantial 11.3 and 6.8 percent at the 75th and 90th percentiles. The stigmatization associated with mental health conditions seems to be expressed in wage gaps for those in high paid jobs, where they are perhaps more visible, even if they are apparently performing on a par with their non-disabled colleagues. There would appear to be greater tolerance of people with mental health problems, such that they are not discriminated against in terms of wages, in less well paid jobs.

There are major wage gaps attributable to relatively disadvantaging work-related characteristics as well as to productivity differences and addressing the education and occupational sorting of disabled people remains a challenge. Moreover, for the most stigmatized group, mentally disabled people, wage discrimination remains a live issue. However, overall, the policy challenges remain much greater in relation to achieving the participation of disabled people in employment than to ensuring their equal wages once they overcome those obstacles to work.

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Appendix: Selection into work

If we aim to estimate a wage equation which is valid for the whole population of individuals working and not working, then we need to take account of the selection into work, as selection into work is likely to be correlated with potential earnings. This is usually done by considering Heckman-type estimation methods which, under some assumptions, produce estimates of the wage regression coefficients which are consistent for the whole population. See Heckman (1979), Heckman (1990), Vella (1998) and Heckman and Navarro-Lozano (2004) for more details.

In wage decomposition analysis the wage equation is estimated separately for two groups of populations, say group *1* (disabled people) and group *0* (non-disabled people). Coefficients corrected for the selection into work can be used to predict the average earnings for the two groups as if everybody were at work. This requires estimating the average of each explanatory variable separately for the two populations using both workers and non-workers. The average earnings for group *0* (*1*) is then computed by summing the products of each estimated coefficient by the corresponding average explanatory variable. The difference between such average earnings computed for population *1* and *0* measures the wage gap which would be observed if everybody were at work, and can be decomposed in the part explained by differences in characteristics and in the residual unexplained gap.

This way to correct the decomposition analysis for the selection into work presents three main issues. First, Heckman-type correction estimation requires the use of instrumental variables that are important to explain the probability of working but irrelevant to explain wage.[7] Second, some of the explanatory variables used in the wage equations are observable only for people at work, which makes it impossible to predict earnings for non workers. Third, it would seem pointless to compute a potential wage gap for the whole population including individuals who never worked and will never enter the labour market because of health or other reasons. Therefore we consider a decomposition of the wage gap corrected for sample selection but only

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[7] The instrumental variables we use in our application are dummies for people married or cohabiting, living in council housing and local unemployment rates. Admittedly they are not ideal instruments, but they are commonly employed in such analyses.

for people active in the labour market.[8] We drop people who have never worked so that we can use the occupation in the last job as explanatory variable in place of current occupation to better predict the wage of people not in work. Nonetheless, we are still compelled to estimate the wage equations without dummies for part-time, public sector and firm size because these are not observable for non-workers.

Table 6: Decomposition of the wage gap at the mean by disability group for people active in the labor market

Disability Group	Wage gap	Explained	Unexplained	Explained Oaxaca
1 Long term physically ill	-0.041*	-0.031	-0.010	-0.018
1a) 1 + does not affect amount of work	-0.015*	-0.021	0.006	-0.004
1b) 2a + does not affect kind of work	0.013*	-0.001	0.014	0.014
1c) 3a + no other conditions	0.015*	0.009	0.006	0.016
2) Physically disabled	-0.097*	-0.032	-0.065	-0.076
2a) 2 + does not affect amount of work	-0.058*	0.002	-0.060	-0.017
2b) 2a + does not affect kind of work	-0.042*	0.035	-0.077	0.020
2c) 2b + no other conditions	-0.029*	0.060	-0.089	0.028
3) Long term mentally ill	-0.293*	-0.201	-0.092	-0.104
3a) 3 + does not affect amount of work	-0.237*	-0.072	-0.166	-0.086
3b) 3a + does not affect kind of work	-0.187*	-0.040	-0.147	-0.062
3c) 3b + no other conditions	-0.135*	-0.013	-0.122	-0.044
4) Mentally disabled	-0.041*	-0.089	0.048	-0.152
4a) 4 + does not affect amount of work	-0.183*	-0.071	-0.112	-0.075
4b) 4a + does not affect kind of work	-0.191*	-0.112	-0.079	-0.043
4c) 4b + no other conditions	-0.196*	-0.033	-0.164	-0.024

Wage gaps that are statistically significant at the 5% and 10% level are indicated with * and [+].

Table 6 reports the mean wage gap predicted for people active in the labour market by different disability groups and its decomposition results. As for the wage gap observed for workers (see Table 3), the wage gap for economically active people reduces for people with disabilities that are less productivity limiting (moving from category *a* to *c*)[9], with the exception of mental disability; and it tends to shrink once we control for differences in characteristics, except for physical disability. The unexplained gap for economically active people is in general larger than

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[8] Note that in our definition of active people we include individuals who are temporarily inactive but actively looking for a job, and those inactive and not looking for a job but who say they would (ideally) like one.

[9] Since we cannot be observe the number of days of sickness leave for non-workers, we do not have the category *d*.

that observed for workers, especially for mentally disabled and long term ill men. This indicates that there may potentially be greater discrimination issue once we take account of selection into work.

These decomposition results inform us about the potential gap we would observe if everybody active were working, but does not inform us about the actual observed wage gap for people at work. To decompose the observed wage gap for workers, we have to explicitly consider in the decomposition analysis the Heckman-type correction terms (such as the inverse Mill's ratio or other more generalized correction terms). However, these terms and their coefficients do not have a clear economic meaning. This makes it difficult to separate the differences between populations in the correction terms and their coefficients in the part to be attributed to different characteristics and in the residual part to be attributed to discrimination. Neuman and Oaxaca (2004) show there are at least four different ways to decompose gaps in the presence of selection issues and all of them are arbitrary and do not necessarily produce the same results.

Our opinion is that Heckman correction terms are useful to produce wage regression coefficients to apply to the whole population (or at least the active population) to decompose the potential wage gap as if everybody were working. If, however, the aim is to decompose the observed wage gap, correction terms are difficult to interpret. We believe it is preferable to try to understand whether the actual observed differences in wage of people working reduce after controlling for characteristics.