The Disability Pay Gap Within and Across Firms

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May 2025

Context

- Disability is a protected characteristic under UK equality legislation
  - Defined as "a physical or mental impairment that has a substantial and long-term adverse effect on one's ability to carry out normal day-to-day activities"
  - Protection from discrimination in employment (recruitment, training, pay etc).
  - No quotas or employer hiring subsidies. Employers must make reasonable adjustments to prevent disabled individuals from being placed at a disadvantage – grants available.
- Disability employment gap of around 30%. Disability pay gap of around 13% (raw).
- Government proposal to compel firms with 250+ employees to report their disability pay gap
- Disability Pay Gap (DPG) neglected relative to pay gaps for other protected characteristics. No evidence on DPGs within or across firms.

Context

- No official medical registration, as in some European countries, and disability-related benefits are only available to those with the most severe impairments.
  - Labour market analysis therefore relies on survey responses to identify disability

- Best-available earnings data is collected from employers by the Office for National Statistics (ONS) and covers 0.7% of all payrolled employees
  - Few demographic characteristics for these employees

Overview

- **What do we do?** We assess the extent to which the UK disability pay gap (DPG) is a consequence of (a) the distribution of employees across high/low wage firms and/or (b) within-firm disability pay gaps

- **How do we do it?** We use payroll data linked to the population census to separate the influence of the distribution of employees across firms from within-firm DPGs

- **What do we find?** Within-firm DPGs are a major component of the overall DPG

- **Why is it important?** Little evidence on the role of the distribution of employees across firms to the DPG. Findings add support to plans for mandatory employer DPG reporting in the UK.

Existing Literature

- DPG is the percentage difference in average hourly pay between disabled and non-disabled employees

- Sizeable in the UK (10-15%) and shows no sign of diminishing

- Decomposing the DPG
  - Personal and job-related characteristics
  - At least 50% unexplained (Jones et al., 2006)
  - Debates about identifying discrimination (Longhi et al., 2012; Kruse et al., 2018)

- Role of the firm
  - Schur et al. (2009) role of corporate culture on gaps in-work outcomes in the US
  - Jones and Latreille (2010) variation in within-workplace DPG using WERS 2004

Data: ASHE-Census

- Payroll information from ASHE 2011 for ~0.7% of all employees
  - Multiple measures of pay (focus on total hourly earnings)
- Personal characteristics from 2011 Census (74% of ASHE 2011 observations)
  - Disability (5.3%)
  - "Are your day-to-day activities limited because of a health problem or disability which has lasted, or is expected to last, at least 12 months? Include problems related to old age".
    - "Yes, limited a lot", "Yes, limited a little", "No"
- Working-age (age 16-64) employees paid an adult rate, earnings unaffected by absence and basic weekly hours (1-99 hours).
- Minimum of two employees within each firm
- 78,037 jobs from 76,505 employees in 8,435 firms

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Table 4: Profile of full ASHE sample compared with ASHE-Census linked sample in 2011 for employees resident in England and Wales

	(1) ASHE sample	(2) ASHE-Census sample	(3) Squared error (1-2)²	(4) ASHE-Census sample	(5) Squared error (1-4)²
	Standard weight	Standard weight		ASHE-Census weight	
Sex					
+ Female	49.32	49.79	0.22	49.42	0.01
+ Male	50.68	50.21	0.22	50.58	0.01
Mean squared error (MSE)			**0.22**		**0.01**
Age group					
+ 16-19	3.61	3.76	0.02	3.62	0.00
+ 20-24	9.13	8.39	0.55	9.08	0.00
+ 25-29	11.35	10.40	0.90	11.30	0.00
+ 30-34	11.46	11.57	0.01	11.43	0.00
+ 35-39	11.52	12.45	0.86	11.50	0.00
+ 40-44	13.00	14.49	2.22	13.01	0.00
+ 45-49	13.25	14.69	2.07	13.26	0.00
+ 50-54	10.99	11.53	0.29	11.03	0.00
+ 55-59	8.46	7.49	0.94	8.53	0.00
+ 60-64	5.27	3.86	1.99	5.29	0.00
+ 65 plus	1.96	1.37	0.35	1.95	0.00
Mean squared error (MSE)			**0.93**		**0.00**
Tenure					
+ less than 1 year	13.84	12.38	2.13	13.76	0.01
+ 1 year but less than 2 years	11.10	10.54	0.31	11.10	0.00
+ 2 years but less than 5 years	24.93	24.86	0.00	24.98	0.00
+ 5 years but less than 10 years	21.75	22.79	1.08	21.78	0.00
+ 10 years but less than 20 years	16.05	17.25	1.44	16.04	0.00
+ 20 years or more	9.22	9.15	0.00	9.22	0.00
+ Missing/invalid tenure	3.10	3.03	0.00	3.13	0.00
Mean squared error (MSE)			**0.71**		**0.00**
Pay decile					
+ 1st decile	2.37	2.32	0.00	2.36	0.00
+ 2nd decile	9.36	8.34	1.04	9.32	0.00
+ 3rd decile	10.43	10.00	0.18	10.44	0.00
+ 4th decile	8.60	8.37	0.05	8.61	0.00
+ 5th decile	9.47	9.40	0.00	9.48	0.00
+ 6th decile	10.21	10.23	0.00	10.21	0.00
+ 7th decile	10.47	10.65	0.03	10.48	0.00
+ 8th decile	11.50	11.84	0.12	11.50	0.00
+ 9th decile	12.80	13.46	0.44	12.80	0.00
+ 10th decile	14.80	15.39	0.35	14.79	0.00
Mean squared error (MSE)			**0.22**		**0.00**

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Disability Pay Gap (raw)

Table 1: Descriptive statistics on earnings (£/hour), by disability

	Basic rate	Total pay
Non-disabled		
Mean	13.92	14.53
N	*73,815*	*73,815*
Disabled		
Mean	12.46	12.95
N	*4,222*	*4,222*
DPG (%)		
Mean	-10.51	-10.88

Covariate-adjusted DPG

$$ln\ W_{ij} = \alpha + \mu D_{ij} + X_{ij}\beta + F_j\gamma + \varepsilon_{ij}$$

- DPG (μ)
  - Employee characteristics: sex and age (and age-squared), highest education, marital status, number of children, age of youngest child, ethnicity and UK born
  - Job-related characteristics: tenure, part-time, collective bargaining, second job and occupation (2010 SOC minor group)
  - Firm characteristics: firm size, industry sector (2007 SIC sections), sector and region
- Within-firm DPG
  - Replace F_j with firm identifiers (φ_j)
- Heterogeneity e.g. gender, sector, firm size and over the wage distribution
  - Recentered influence function (RIF)-OLS earnings equations (Firpo and Pinto, 2016)
- Extend established decomposition methods (Oaxaca, 1973; Blinder, 1973)

Disability Pay Gap (adjusted)

Table 2: Raw and adjusted DPG, across and within firms

	Raw	Raw: within-firm	Adjusted: employee and job characteristics	Adjusted: employee, job and firm characteristics	Adjusted: employee and job characteristics within-firm
	(1)	(2)	(3)	(4)	(5)
Total pay	-0.095***	-0.068***	-0.040***	-0.036***	-0.032***
	(0.008)	(0.007)	(0.005)	(0.005)	(0.005)
N	78,037	78,037	78,037	78,037	78,037
Adj R-squared	0.002	0.377	0.650	0.685	0.737

Notes: OLS regression coefficients, estimated from ASHE-Census 2011. DPG calculated as the difference in log points between the log hourly wages of disabled employees and non-disabled employees. Key to statistical significance: *** $p<0.01$; ** $p<0.05$; * $p<0.1$.

Decomposition

Step 1: Wage equation with Firm FEs: share of wage gap attributable to differences in education, occupation etc, and differences in the firms that employees work for

$$ln\ W_{ij} = \alpha + \omega D_{ij} + X_{ij}\delta + \varphi_j + \varepsilon_{ij}$$

$$E\big[lnW_{ij}|D=1\big] - E\big[lnW_{ij}|D=0\big] = \{E[X_{ij}|D=1] - E[X_{ij}|D=0]\}\hat{\delta} + \{E[\hat{\varphi}_j|D=1] - E[\hat{\varphi}_j|D=0]\} + \omega$$

Step 2: Wage equation of firms' "average wage residual": share of gap attributable to differences in observed vs unobserved firm characteristics.

$$\hat{\varphi}_{ij} = \delta + \theta D_{ij} + F_j\vartheta + \rho_{ij}$$

$$E[\hat{\varphi}_{ij}|D=1] - E[\hat{\varphi}_{ij}|D=0] = \{E[F_j|D=1] - E[F_j|D=0]\}\hat{\vartheta} + \theta$$

Table 3: Decomposition of DPG

			% of DPG	
Raw DPG	-0.095	***		
	(0.008)			
Demographic characteristics	0.014	***	-15%	
	(0.001)			
Highest qualifications	-0.019	***	20%	
	(0.002)			47%
Occupation	-0.047	***	49%	
	(0.004)			
Job characteristics, other than occupation	0.007	***	-7%	
	(0.001)			
Unexplained within firm	-0.032	***	34%	
	(0.004)			
Firm characteristics	-0.010	***	10%	
	(0.002)			
Unexplained between firms	-0.009	***	9%	
	(0.003)			

Notes: Estimates based on OB decomposition methods, as set out in the text, applied to total hourly earnings from ASHE-Census 2011. Robust standard errors estimated via the delta method and reported in parentheses. Key to statistical significance: *** p<0.01; ** p<0.05; * p<0.1. Components may not sum to raw DPG due to rounding errors.

Table 4: Heterogeneity in the DPG by firm size

|	Raw	Raw: within-firm	Adjusted: employee and job characteristics	Adjusted: employee, job and firm characteristics	Adjusted: emp. and job chars. within-firm
	(1)	(2)	(3)	(4)	(5)
Disabled	-0.118***	-0.025	-0.027*	-0.023	0.002
	(0.026)	(0.021)	(0.016)	(0.015)	(0.014)
250-999 employees	0.060***		0.032***	0.031***	
	(0.008)		(0.005)	(0.005)	
1,000-4,999 employees	0.081***		0.059***	0.052***	
	(0.007)		(0.005)	(0.004)	
5,000+ employees	-0.015**		0.044***	0.045***	
	(0.007)		(0.004)	(0.004)	
Disabled x 250-999 employees	0.027	-0.032	-0.002	-0.002	-0.022
	(0.034)	(0.028)	(0.022)	(0.021)	(0.019)
Disabled x 1,000-4,999 employees	0.035	-0.048*	-0.020	-0.021	-0.047***
	(0.031)	(0.026)	(0.019)	(0.018)	(0.017)
Disabled x 5,000+ employees	0.027	-0.048**	-0.015	-0.016	-0.036**
	(0.028)	(0.023)	(0.017)	(0.016)	(0.015)
Adj R-squared	*0.008*	*0.377*	*0.651*	*0.685*	*0.737*
N	*78,037*	*78,037*	*78,037*	*78,037*	*78,037*

Notes: OLS regression coefficients for total hourly earnings, estimated from ASHE-Census 2011. Key to statistical significance: *** p<0.01; ** p<0.05; * p<0.1.

Table A.9: Heterogeneity in the DPG by share disabled employees in the firm.

Dependent variable: Ln(Total pay per hour)	Raw	Raw: within-firm	Adjusted: employee and job characteristics	Adjusted: Employee, job and firm characteristics	Adjusted: employee and job characteristics within-firm
	(1)	(2)	(3)	(4)	(5)
For enterprises with 5,000+ employees:					
Disabled	-0.073	-0.047	-0.025	-0.018	-0.020
	(0.063)	(0.047)	(0.035)	(0.033)	(0.034)
Share disabled 2.5-4.9%	-0.101 ***		-0.047 ***	-0.009 *	
	(0.010)		(0.006)	(0.005)	
Share disabled 5.0-7.4%	-0.180 ***		-0.059 ***	-0.016 ***	
	(0.009)		(0.005)	(0.005)	
Share disabled 7.5%+	-0.071 ***		-0.075 ***	-0.031 ***	
	(0.010)		(0.006)	(0.006)	
Disabled * Share disabled 2.5-4.9%	-0.019	-0.049	-0.019	-0.027	-0.028
	(0.069)	(0.053)	(0.038)	(0.036)	(0.036)
Disabled * Share disabled 5.0-7.4%	-0.012	-0.031	-0.010	-0.020	-0.019
	(0.065)	(0.049)	(0.036)	(0.034)	(0.035)
Disabled * Share disabled 7.5+%	0.009	-0.017	0.017	0.012	0.011
	(0.065)	(0.050)	(0.036)	(0.034)	(0.035)
N	39,738	39,738	39,738	39,738	39,738
Adjusted R-squared	0.017	0.325	0.684	0.720	0.738

Notes: OLS regression coefficients, estimated from ASHE-Census 2011. Sample constrained to firms with 5,000 or more employees and at least 25 observations in ASHE. Key to statistical significance: *** $p<0.01$; ** $p<0.05$; * $p<0.1$.

Extent, Gender, FT, Sector

Figure 1: Raw and adjusted DPG, across and within firms, across the wage distribution
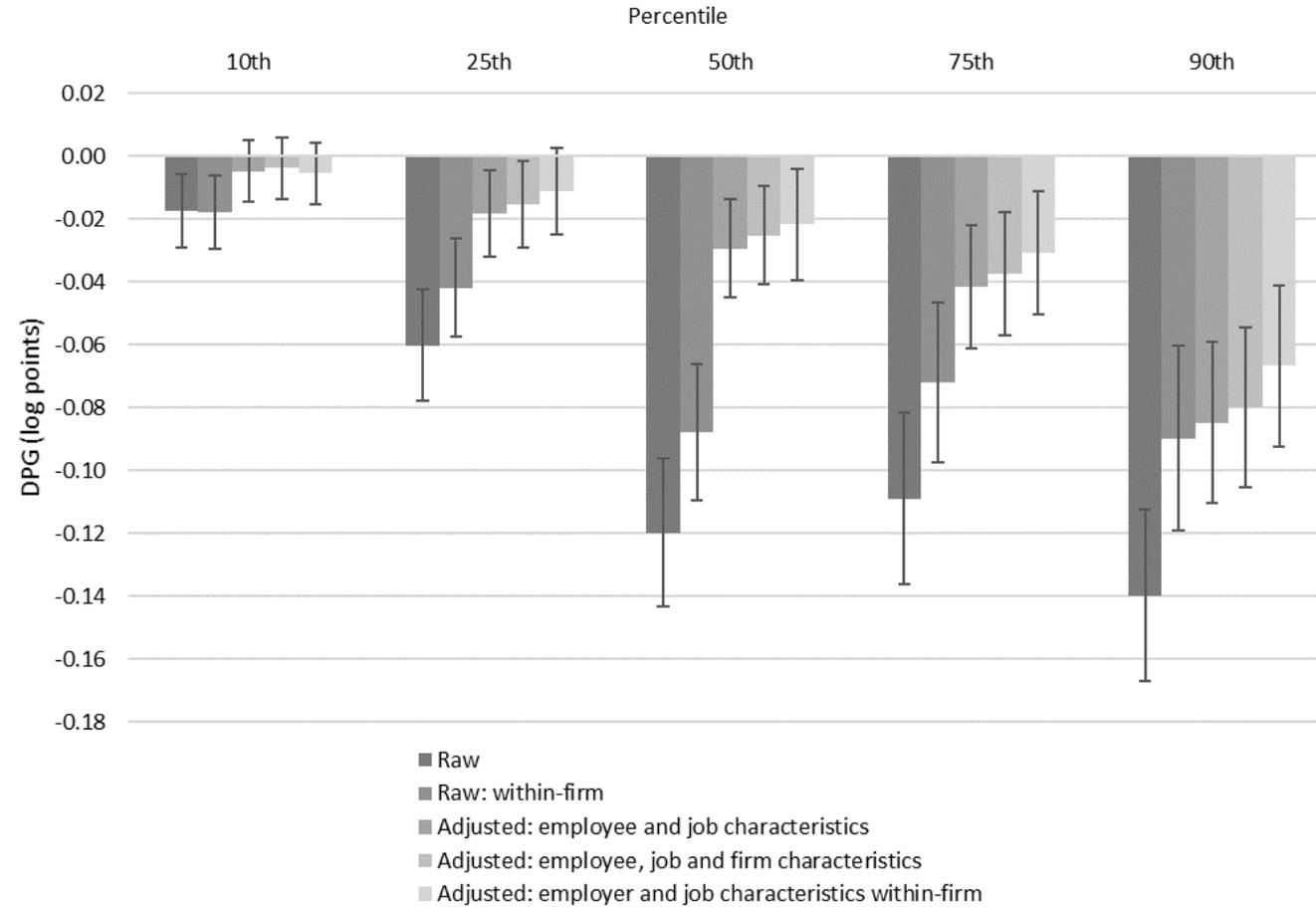
Notes: Recentered influence function (RIF)-OLS regression coefficients for total hourly earnings, estimated from ASHE-Census 2011. Error bars show 95% confidence intervals.

Conclusions

- DPG and unexplained DPG

  - Mainly exist within firms

  - Within-firm DPGs are reinforced by the allocation of disabled employees across firms

  - Failure to account for firm allocation results in disability-related wage inequality being overestimated by 12-20%

- Role for employer focus of DPG reporting

  - Large firms have larger within-firm DPG, suggests effective targeting of legislation

  - No current association with % disabled in the firm, but DPG reporting may -> disincentive to hire

  - Value in reporting workforce disability composition

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Table 3(a): Decomposition of DPG

			% of DPG	
Raw DPG	-0.095	***		
	(0.008)			
DPG Decomposition using observables				
Demographic characteristics	0.015	***	-15%	
	(0.002)			
Highest qualifications	-0.021	***	23%	
	(0.002)			48%
Occupation	-0.049	***	52%	
	(0.004)			
Job characteristics, other than occupation	0.011	***	-11%	
	(0.001)			
Firm characteristics	-0.013	***	14%	
	(0.002)			
Unexplained	-0.036	***	38%	
	(0.005)			

Notes: Estimates based on OB decomposition methods, as set out in the text, applied to total hourly earnings from ASHE-Census 2011. Robust standard errors estimated via the delta method and reported in parentheses. Key to statistical significance: *** p<0.01; ** p<0.05; * p<0.1. Components may not sum to raw DPG due to rounding errors.

Table A.8: Heterogeneity in the DPG by: disability extent, gender, sector and pay setting

Dependent variable: Ln(Total pay per hour)	Raw		Raw: within-firm		Adjusted: employee and job characteristics		Adjusted: employee and job and firm characteristics		Adjusted: employee and job characteristics within-firm	
	(1)		(2)		(3)		(4)		(5)	
Extent of disability:										
Limited a lot	-0.155	***	-0.098	***	-0.066	***	-0.060	***	-0.060	***
	(0.020)		(0.017)		(0.013)		(0.012)		(0.012)	
Limited a little	-0.084	***	-0.062	***	-0.035	***	-0.032	***	-0.027	***
	(0.009)		(0.007)		(0.005)		(0.005)		(0.005)	
N	*78,037*		*78,037*		*78,037*		*78,037*		*78,037*	
Adjusted R-squared	*0.002*		*0.377*		*0.650*		*0.685*		*0.737*	
By gender:										
Disabled	-0.070	***	-0.052	***	-0.029	***	-0.026	***	-0.026	***
	(0.010)		(0.009)		(0.006)		(0.006)		(0.006)	
Male	0.201	***	0.188	***	0.111	***	0.103	***	0.094	***
	(0.004)		(0.004)		(0.003)		(0.003)		(0.003)	
Disabled*Male	-0.032	**	-0.023	*	-0.024	**	-0.023	**	-0.015	*
	(0.016)		(0.014)		(0.010)		(0.009)		(0.009)	
N	*78,037*		*78,037*		*78,037*		*78,037*		*78,037*	
Adjusted R-squared	*0.039*		*0.402*		*0.650*		*0.685*		*0.737*	

Dependent variable: Ln(Total pay per hour)	Raw		Raw: within-firm		Adjusted: employee and job characteristics		Adjusted: employee and job and firm characteristics		Adjusted: employee and job characteristics within-firm	
	(1)		(2)		(3)		(4)		(5)	
By sector:										
Disabled	-0.087	***	-0.072	***	-0.031	***	-0.030	***	-0.026	***
	(0.011)		(0.011)		(0.007)		(0.007)		(0.007)	
Private	-0.154	***			0.001		-0.022	***		
	(0.004)				(0.003)		(0.004)			
Disabled*Private	-0.030	*	0.007		-0.015		-0.010		-0.011	
	(0.016)		(0.014)		(0.010)		(0.009)		(0.009)	
N	78,037		78,037		78,037		78,037		78,037	
Adjusted R-squared	0.023		0.377		0.650		0.685		0.737	
By coverage of collective agreement:										
Disabled	-0.132	***	-0.064	***	-0.052	***	-0.045	***	-0.034	***
	(0.014)		(0.011)		(0.009)		(0.008)		(0.008)	
Pay set by collective agreement	0.071	***	-0.138	***	0.007	***	0.018	***	-0.043	***
	(0.004)		(0.009)		(0.003)		(0.003)		(0.006)	
Disabled*Pay set by coll. agt.	0.052	***	-0.005		0.019	*	0.014		0.002	
	(0.017)		(0.014)		(0.010)		(0.010)		(0.010)	
N	78,037		78,037		78,037		78,037		78,037	
Adjusted R-squared	0.007		0.379		0.650		0.685		0.737	

Notes: OLS regression coefficients, estimated from ASHE-Census 2011. Key to statistical significance: *** $p<0.01$; ** $p<0.05$; * $p<0.1$.

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