Supplementary Materials for

AI technologies and employee pay in the UK: evidence from matched employer-employee data

The following pages include output from the descriptive comparisons and multilevel regression analyses to supplement the main findings reported in the article. We begin with providing reassurance that imputed data at level two has not distorted the distribution of technology (see table S1 below). Indeed, mean level values for overall digital technology investment and AI equipment are only marginally lower in the imputed data set. Median values and standard deviation for the imputed data also closely resemble those for the non-imputed data.

Table S1: Comparison of Employer AI adoption for imputed and non-imputed data

	Non-imputed	Imputed
Employer Digital technology investment		
mean	0.36	0.34
Std. dev.	0.30	0.30
median	0.29	0.29
Employer adoption of AI equipment		
Mean	0.08	0.06
Std. dev.	0.16	0.14
Median	0.00	0.00
Employer adoption of AI applications		
Mean	0.09	0.09
Std. dev.	0.18	0.17
Median	0.00	0.00

Considering the hierarchical nature of our merged dataset, we used multilevel regression models that partition variance into level one (variance between employees) and level two (variance between industry-region-size clusters) to analyse the relationship between the adoption and employee use of AI technologies and pay. We ran conventional tests to determine whether multilevel (hierarchical) modelling was appropriate. Comparisons between the fixed effects and multilevel maximum likelihood models are reported in Table S2 below. First, the interclass correlation coefficient (ICC1) suggested that around 19 per cent of the overall variation in pay could be attributed to differences across industry-region-firm size clusters. Second, a random intercept multilevel model fared better than a single level model, based on model comparison indices: AIC and BIC.

Table S2: Comparison of multilevel random intercept and single level regression model performance

Outcome variable	Model	AIC	BIC	ICC
Pay	**MLM**	**17357**	**17376**	0.19
	Single level	17863	17877	

The baseline regression models reported in this study are random intercept models with a maximum likelihood estimator. We tested for the applicability of random slope models, but these did not show improvements relative to random intercept regressions. Having fitted the baseline random intercept models with both level one and level two AI adoption and ICT variables we estimated regressions with interaction effects between technology, qualification and employee voice. We further tested for multicollinearity between age and tenure. Correlation between age and tenure is only moderate (r=0.34). Ran regression for direct effect and checked for multicollinearity using VIF scores. No score higher than 1.32. This indicates an absence of multicollinearity.

Lastly, we checked for relationship between qualifications and SOC occupational skill groups. Correlation between these two variables is moderate at r=0.31. Moreover, treating them as factors and performing cross tabulations reiterates this (see table S3 below).

Table S3: Cross-tabulation occupational skill groups and qualifications

	SOC Skill 1	SOC Skill 2	SOC Skill 3	SOC Skill 4	Total
No qualification	29 (21.0%)	65 (47.1%)	34 (24.6%)	9 (6.5%)	138 (100%)
Other qualification	40 (11.6%)	158 (45.7%)	101 (29.2%)	38 (11.0%)	346 (100%)
Other qualification below A levels or vocational level 3 or equivalent	99 (9.9%)	523 (52.4%)	214 (21.4%)	121 (12.1%)	999 (100%)
A levels of vocational level 3 or equivalent, and above	91 (6.6%)	665 (48.4%)	303 (22.1%)	246 (17.9%)	1373 (100%)
Degree or equivalent, and above	71 (2.7%)	715 (27.5%)	458 (17.6%)	1070 (41.1%)	2604 (100%)

Tables S4 below reports regression estimates for the relationship between technology adoption at levels one and two showing that the measurements derived from employee and employer surveys are indeed correlated with one another.

Table S4: Regression result for the relationship between AI Level 1 and Level 2

	AI Software Lvl1		**AI Hardware Lvl1**	
Predictors	*Estimates*	*p*	*Estimates*	*p*
(Intercept)	2.14 (2.08 – 2.20)	**<0.001**	2.24 (2.18 – 2.30)	**<0.001**
AI Applications Lvl2	0.37 (0.08 – 0.66)	**0.013**		
AI Equipment Lvl2			0.58 (0.19 – 0.96)	**0.004**
Random Effects				
σ^2	1.50		1.63	
τ_{00}	0.19 $_{SectorRegionSize}$		0.20 $_{SectorRegionSize}$	
ICC	0.11		0.11	
N	581 $_{SectorRegionSize}$		581 $_{SectorRegionSize}$	
Observations	5343		5354	
Marginal R^2 / Conditional R^2	0.003 / 0.116		0.004 / 0.113	

Table S5 reports regression estimates for the relationship between AI adoption and pay.

Table S6 and S7 contain estimates for the interaction effect between AI adoption, occupation and qualification skill groups corresponding to our machine learning analysis in the main article. Table S8 adds the interaction effect with employee voice.

Lastly, Figures S1 and S2 visualise the interaction effects with occupation/qualification groups and employee voice respectively.

Table S5: Regression results for the effect of AI adoption on employee pay

	pay_numeric			**pay_numeric**			**pay_numeric**			**pay_numeric**		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
(Intercept)	2.55	2.46 – 2.64	**<0.001**	-3.07	-3.47 – -2.67	**<0.001**	2.96	2.89 – 3.04	**<0.001**	-2.59	-2.98 – -2.20	**<0.001**
Employee adoption of AI	0.21	0.18 – 0.24	**<0.001**	0.17	0.14 – 0.20	**<0.001**						
Age				0.07	0.05 – 0.09	**<0.001**				0.06	0.05 – 0.08	**<0.001**
Age square				-0.00	-0.00 – -0.00	**<0.001**				-0.00	-0.00 – -0.00	**<0.001**
Hours weekly				0.33	0.28 – 0.38	**<0.001**				0.35	0.30 – 0.40	**<0.001**
Skill SOC				0.50	0.46 – 0.54	**<0.001**				0.52	0.49 – 0.56	**<0.001**
qualifications numeric				0.12	0.09 – 0.15	**<0.001**				0.12	0.09 – 0.15	**<0.001**
size numeric				0.13	0.09 – 0.18	**<0.001**				0.14	0.10 – 0.19	**<0.001**
tenure numeric				0.17	0.12 – 0.21	**<0.001**				0.18	0.13 – 0.23	**<0.001**
Rep TU numeric				-0.02	-0.09 – 0.05	0.532				0.00	-0.07 – 0.07	0.975
gender2				0.33	0.26 – 0.39	**<0.001**				0.36	0.30 – 0.43	**<0.001**
ethniccat4 [Black, Black British, Caribbean or African]				-0.11	-0.31 – 0.09	0.268				-0.06	-0.26 – 0.13	0.520
ethniccat4 [Mixed, multiple or other ethnic group]				0.18	-0.03 – 0.39	0.100				0.23	0.02 – 0.45	**0.031**
ethniccat4 [White]				0.16	0.03 – 0.29	**0.015**				0.13	-0.00 – 0.26	0.056
Rep workcouncils numeric				0.26	0.16 – 0.36	**<0.001**				0.38	0.29 – 0.48	**<0.001**

Employer adoption of AI				0.66	0.18 – 1.15	**0.008**	0.33	0.00 – 0.66	**0.050**
Random Effects								
σ^2	1.47	1.04	1.50				1.05	
τ_{00}	0.28 $_{SectorRegionSize}$	0.08 $_{SectorRegionSize}$	0.34 $_{SectorRegionSize}$				0.09 $_{SectorRegionSize}$	
ICC	0.16	0.07	0.18				0.08	
N	574 $_{SectorRegionSize}$	566 $_{SectorRegionSize}$	576 $_{SectorRegionSize}$				568 $_{SectorRegionSize}$	
Observations	5036	4538	5184				4676	
Marginal R^2 / Conditional R^2	0.034 / 0.187	0.381 / 0.424	0.004 / 0.187				0.359 / 0.412	

Table S6: Regression results for the moderating effect of qualifications for the AI adoption-employee pay relationship

	pay_numeric			pay_numeric		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
(Intercept)	-2.56	-2.92 – -2.21	**<0.001**	-1.62	-1.91 – -1.33	**<0.001**
Employee adoption of AI	0.42	0.32 – 0.52	**<0.001**			
qualifications numeric	0.25	0.19 – 0.31	**<0.001**	0.12	0.08 – 0.15	**<0.001**
Age	0.01	0.01 – 0.02	**<0.001**	0.01	0.01 – 0.01	**<0.001**
Hours weekly	0.34	0.29 – 0.39	**<0.001**	0.37	0.32 – 0.42	**<0.001**
Skill SOC	0.50	0.47 – 0.54	**<0.001**	0.53	0.50 – 0.57	**<0.001**
size numeric	0.14	0.10 – 0.19	**<0.001**	0.16	0.11 – 0.20	**<0.001**
tenure numeric	0.20	0.15 – 0.25	**<0.001**	0.21	0.16 – 0.26	**<0.001**
gender2	0.34	0.28 – 0.41	**<0.001**	0.38	0.31 – 0.44	**<0.001**
ethniccat4 [Black, Black British, Caribbean or African]	-0.09	-0.29 – 0.11	0.371	-0.04	-0.24 – 0.16	0.680
ethniccat4 [Mixed, multiple or other ethnic group]	0.16	-0.05 – 0.38	0.131	0.23	0.02 – 0.45	**0.033**
ethniccat4 [White]	0.16	0.03 – 0.29	**0.019**	0.12	-0.01 – 0.26	0.064
Employee adoption of AI × qualifications numeric	-0.06	-0.08 – -0.03	**<0.001**			
Employer adoption of AI				0.59	-0.40 – 1.58	0.241
Employer adoption of AI × qualifications numeric				-0.05	-0.27 – 0.18	0.667
Random Effects						
σ^2	1.05			1.07		
τ_{00}	0.08 $_{SectorRegionSize}$			0.10 $_{SectorRegionSize}$		
ICC	0.07			0.08		
N	566 $_{SectorRegionSize}$			568 $_{SectorRegionSize}$		
Observations	4538			4676		
Marginal R^2 / Conditional R^2	0.372 / 0.418			0.345 / 0.400		

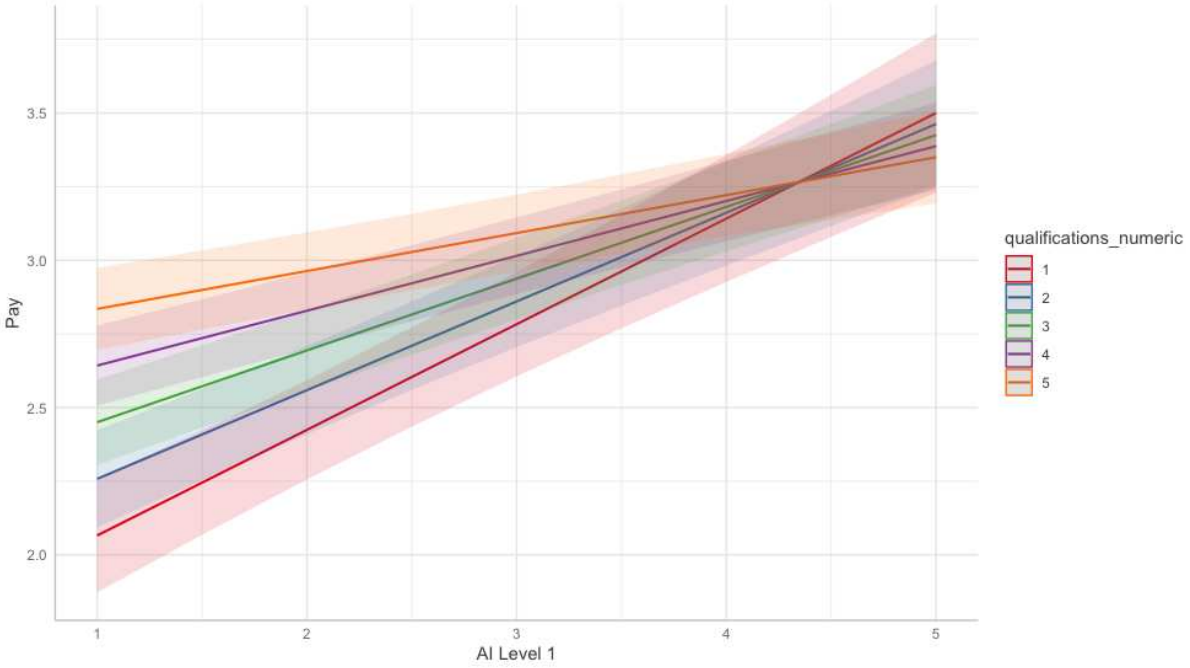
Table S7: Regression results for the moderating effect of occupational skill groups for the AI adoption-employee pay relationship

	pay_numeric			pay_numeric		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
(Intercept)	-2.34	-2.67 – -2.01	**<0.001**	-1.57	-1.86 – -1.28	**<0.001**
Employee adoption of AI	0.31	0.23 – 0.39	**<0.001**			
Skill SOC	0.61	0.54 – 0.68	**<0.001**	0.52	0.48 – 0.56	**<0.001**
Age	0.01	0.01 – 0.02	**<0.001**	0.01	0.01 – 0.01	**<0.001**
Hours weekly	0.34	0.29 – 0.39	**<0.001**	0.37	0.32 – 0.42	**<0.001**
qualifications numeric	0.12	0.08 – 0.15	**<0.001**	0.11	0.08 – 0.14	**<0.001**
size numeric	0.14	0.09 – 0.19	**<0.001**	0.15	0.11 – 0.20	**<0.001**
tenure numeric	0.20	0.15 – 0.25	**<0.001**	0.21	0.17 – 0.26	**<0.001**
gender2	0.34	0.27 – 0.40	**<0.001**	0.38	0.31 – 0.44	**<0.001**
ethniccat4 [Black, Black British, Caribbean or African]	-0.09	-0.29 – 0.11	0.388	-0.04	-0.24 – 0.16	0.676
ethniccat4 [Mixed, multiple or other ethnic group]	0.18	-0.04 – 0.39	0.104	0.23	0.02 – 0.45	**0.032**
ethniccat4 [White]	0.17	0.04 – 0.30	**0.012**	0.12	-0.01 – 0.26	0.063
Employee adoption of AI × Skill SOC	-0.05	-0.07 – -0.02	**0.001**			
Employer adoption of AI				-0.18	-1.06 – 0.69	0.677
Employer adoption of AI × Skill SOC				0.19	-0.08 – 0.47	0.164
Random Effects						
σ^2	1.05			1.08		
τ_{00}	0.08 $_{\text{SectorRegionSize}}$			0.10 $_{\text{SectorRegionSize}}$		
ICC	0.07			0.08		
N	566 $_{\text{SectorRegionSize}}$			568 $_{\text{SectorRegionSize}}$		
Observations	4538			4676		
Marginal R^2 / Conditional R^2	0.371 / 0.416			0.346 / 0.400		

Table S8: Regression results for the moderating effect of employee voice for the AI adoption-employee pay relationship

	pay_numeric			pay_numeric		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
(Intercept)	-2.55	-3.15 – -1.95	**<0.001**	-1.61	-2.07 – -1.15	**<0.001**
Employee adoption of AI	0.41	0.22 – 0.60	**<0.001**			
voice	0.22	-0.02 – 0.46	0.078	-0.02	-0.18 – 0.13	0.766
Age	0.01	0.01 – 0.02	**<0.001**	0.01	0.00 – 0.01	**<0.001**
Hours weekly	0.38	0.32 – 0.44	**<0.001**	0.40	0.34 – 0.46	**<0.001**
qualifications numeric	0.11	0.08 – 0.15	**<0.001**	0.11	0.07 – 0.14	**<0.001**
Skill SOC	0.50	0.46 – 0.54	**<0.001**	0.52	0.48 – 0.57	**<0.001**
size numeric	0.13	0.08 – 0.18	**<0.001**	0.14	0.09 – 0.19	**<0.001**
tenure numeric	0.21	0.16 – 0.27	**<0.001**	0.23	0.17 – 0.29	**<0.001**
gender2	0.33	0.25 – 0.40	**<0.001**	0.37	0.29 – 0.44	**<0.001**
ethniccat4 [Black, Black British, Caribbean or African]	-0.16	-0.40 – 0.08	0.200	-0.12	-0.36 – 0.13	0.356
ethniccat4 [Mixed, multiple or other ethnic group]	0.16	-0.10 – 0.42	0.234	0.24	-0.02 – 0.50	0.074
ethniccat4 [White]	0.15	-0.01 – 0.31	0.063	0.12	-0.04 – 0.27	0.154
Employee adoption of AI × voice	-0.11	-0.20 – -0.02	**0.015**			
Employer adoption of AI				1.60	-0.61 – 3.80	0.157
Employer adoption of AI × voice				-0.55	-1.49 – 0.39	0.252
Random Effects						
σ^2	1.07			1.10		
τ_{00}	0.07 $_{\text{SectorRegionSize}}$			0.08 $_{\text{SectorRegionSize}}$		
ICC	0.06			0.07		
N	463 $_{\text{SectorRegionSize}}$			465 $_{\text{SectorRegionSize}}$		
Observations	3437			3538		
Marginal R^2 / Conditional R^2	0.364 / 0.403			0.339 / 0.385		

Figures S1: Interaction effect between AI adoption and qualification skill groups



Figures S2: Interaction effect between AI adoption and employee voice