Online appendix

Table A1: Full results for models using all demographic variables, England and Wales.

	Standard probit	Fixed effects probit	Random effects probit	Fractional probit	L.D.A.
education	-4.74^{**}	-4.09^{**}	-4.30^{**}	-1.31^{**}	1.25
median age	0.02^{**}	0.03^{**}	0.03^{**}	0.01^{**}	-0.44
birthplace	-0.32	0.25	-0.03	-0.15	0.17
ethnicity	0.24	-0.11	0.03	0.15^{**}	-0.30
gender	7.73^{**}	7.32^{**}	7.09^{**}	1.44^{**}	-0.29
occupation	-1.79^{**}	-1.04	-1.29^{*}	-0.21^{*}	0.34

Notes: * $p < 0.05$, ** $p < 0.01$. Neither the standard probit model nor the linear discriminant analysis include fixed or random regional effects. The four columns of results for the probit models report average partial effects, i.e. $\mathbb{E}[dy/dx]$. The final column reports the standardized canonical discriminant function coefficients returned from the linear discriminant analysis.

Table A2: Full-sample results: per cent of local authorities correctly classified using 2016 Annual Population Survey data on qualifications.

	England and Wales			Great Britain		
	All	Leave	Remain	All	Leave	Remain
Standard probit:						
Education only	89.3	94.7	72.6	81.0	90.9	58.6
Fixed effects probit:						
Education only	89.9	95.1	73.8	82.3	90.1	64.7
Fixed effects fractional probit:						
Education only	89.4	92.0	81.2	83.9	87.5	76.1
Random effects probit:						
Education only	89.1	94.7	71.8	90.5	95.1	80.3
Linear discriminant analysis:						
Education only	89.6	96.6	67.9	82.1	93.5	56.0

Notes: The standard probit model does not include fixed or random regional effects. The random effects model is estimated using meprobit in Stata. The data are the percentage of local authority populations aged 16-64 with a degree or equivalent qualification, and correspond to the 12 months up to December 2016 (so the 2016 referendum is roughly in the middle of the data collection period). The Isles of Scilly are not included, as there is no observation for this local authority. The data were sourced from NOMIS.

Table A3: Results for the fixed effects fractional probit model, England and Wales, with observations weighted by valid votes cast.

	education only	all demog. vars.	all demog. vars. except education
education	-1.15^{**}	-1.31^{**}	
median age		0.01^{**}	0.00^{**}
birthplace		-0.10^{**}	0.62^{**}
ethnicity		0.15^{**}	-0.30^{**}
gender		1.70^{**}	0.52^{**}
occupation		-0.18^{**}	1.03^{**}

Notes: * $p < 0.05$, ** $p < 0.01$. The reported results are average partial effects, i.e. $\mathbb{E}[dy/dx]$, for the fractional probit model with regional fixed effects and frequency weights defined by valid votes cast per local authority. So Birmingham, for example, in which 450,702 valid votes were cast, receives a weighting approximately four times that of Hull, in which 113,355 valid votes were cast.

Table A4: Residual spatial correlation tests for the standard and fixed effects probit models.

	England and Wales	
	I^2	p-value
Standard probit:		
Education only	4.304	0.038
All demography	10.051	0.002
All demog. minus educ.	22.879	0.000
Fixed effects probit:		
Education only	0.185	0.668
All demography	2.243	0.134
All demog. minus educ.	2.563	0.109

Notes: Following Amaral, Anselin & Arribas-Bel (2013) [Testing for spatial error dependence in probit models, *Letters in Spatial and Resource Sciences*, 6(2), 91-101], we report the I^2 test statistic from the Moran's I test for models with binary dependent variables proposed by Kelejian & Prucha (2001) [On the asymptotic distribution of the Moran I test statistic with applications, *Journal of Econometrics*, 104(2), 219-257]. The test statistic is,

$$I^2 = \frac{(e_1' W e_1)^2}{\mathrm{tr}\,(W\Sigma W\Sigma + W'\Sigma W\Sigma)},$$

where the elements of the column vector e_1 are residuals defined by,

$$e_{1i} = y_i - \Phi(\mathbf{x}_i\hat{\beta}),$$

for observation i, and Σ is a diagonal matrix containing the variances of the residuals on the main diagonal, $\hat{\sigma}_i^2 = \hat{\Phi}_i(1-\hat{\Phi}_i)$. The matrix W is a spatial distance matrix with zeros on the main diagonal. We use an inverse distance matrix, where the distances are measured from the population-weighted centroids of each local authority district, and we normalise W such that its largest eigenvalue is 1.

The test statistic is asymptotically distributed as $\chi^2(1)$ under the null of no spatial autocorrelation. As reported in Amaral et al. (2013), the test is unbiased across a wide range of sample sizes, and achieves its asymptotic distribution under the null for considerably smaller sample sizes than we use in this paper. In addition, it has good power against the alternative, and the test does not appear to be affected by spatial correlation in the regressors.

Table A5: Multicollinearity statistics for all demographic variables, England and Wales.

	VIF	SQRT VIF	Tolerance	R^2
education	7.46	2.73	0.1341	0.8659
median age	2.89	1.70	0.3465	0.6535
birthplace	11.28	3.36	0.0886	0.9114
ethnicity	9.29	3.05	0.1077	0.8923
gender	1.37	1.17	0.7308	0.2692
occupation	6.17	2.48	0.1622	0.8378

Notes: R^2 is calculated by regressing the variable in question on all remaining variables; tolerance is given by $1 - R^2$; VIF (variance inflation factor) is given by $(1 - R^2)^{-1}$. A tolerance of less than 0.1, or equivalently a VIF of greater than 10, is usually seen as evidence of multicollinearity. VIF can be interpreted as the factor by which OLS estimator variances are inflated due to the presence of multicollinearity, so the square root of the VIF is the factor by which OLS estimator standard deviations are inflated. Note that this does not directly translate to the limited dependent variable models used in the paper.