**Electronic Supplementary Material**

Migration

We use data from the Business Services Organisation (BSO) on migration and address changes from year 2001 until 2014. These data comprise every individual in the Northern Ireland Longitudinal Study (NILS) (i.e. 28% of the enumerated population) which corresponds to 151774 individuals aged 16 to 39 years in 2001. We use data on one migration event per person (the first event) and run regression models to examine *i*) individual predictors of out-migration by sex, *ii*) area-level predictors of out-migration by sexand *iii*) the distribution of individuals migrating to a given ward by the sex ratio of the original (source) ward, for individuals who migrate within Northern Ireland.

***i*) Individual predictors of out-migration by sex**

Overall, 51.8% of women out-migrate from their ward at least once during the study period, compared to 47.6% of men. The effect of marital status on migration varies by sex; never married women are more likely to migrate than men who are never married, whereas men are more likely to migrate if separated or divorced (Figure S1).

**Figure S1.** Predicted probability of out-migration, by sex and marital status. Based on multilevel logistic regression for 151774 individuals aged 16 to 39 years, controlling for religion (Catholic, Protestant, none/other).

***ii) Area-level predictors of out-migration by sex***

We test whether certain ward-level characteristics predict a larger degree of out-migration for one sex than the other by running multilevel logistic regressions for moving out of the ward between 2001 and 2014 with an interaction between sex and the ward-level variable of interest. AIC values for all interaction models implied a better fit than for the main models without interaction. Thus, we can conclude that women are significantly more likely to emigrate from areas with higher ward-level deprivation, rural areas, areas with low population density and areas with male-biased sex ratio) (see table S1).

|  |  |  |  |
| --- | --- | --- | --- |
| **Model** | **k** | **AIC** | **dAIC** |
| Deprivation | 7 | 206800.5 | 13 |
| Sex\*deprivation | 11 | 206787.5 | 0 |
|  |  |  |  |
| Urban | 4 | 172192.1 | 127 |
| Sex\*urban | 5 | 172065.1 | 0 |
|  |  |  |  |
| Population density | 7 | 205365.0 | 133.2 |
| Sex\*population density | 11 | 205231.8 | 0 |
|  |  |  |  |
| ASR | 7 | 205604.6 | 89.3 |
| Sex\*ASR | 11 | 205515.3 | 0 |

**Table S1**. Multilevel logistic models for out-migration by sex and ward level characteristics. Numeric ward level variables are categorised in quintiles according to standard categorisations. AIC-Akaike information criterion. K-parameters. dAIC- deviation from the best model’s AIC.

***iii*) Where do out-migrators migrate to?**

54.3% of women who move out of a highly female-biased ward, move into an area that is also highly female-biased (Table S2). 50.5% of women who move out of a highly male-biased ward, move into a ward that is also highly male-biased. 51.8% of men who move out of a highly female-biased ward, move into an area that is also highly female-biased. 53.3% of men who move out of a highly male-biased ward, move into a ward that is also highly male-biased (table S2). Not only are women on average more likely to move, they are also more likely to move to a more female-biased ward (Z= -4.3, *p*<=0.000).

|  |  |  |
| --- | --- | --- |
|  |  | ASR of the ward moved into |
|  |  |  1st quartile  | 2nd quartile  | 3rd quartile  | 4th quartile  |
| ASR of ward moved out of |  1st quartile  | 54.3% | 21.4% | 14.4% | 9.9% |
|  2nd quartile  | 21.8% | 46.6% | 17.6% | 14.1% |
|  3rd quartile  | 17.6% | 25.7% | 41.6% | 15.2% |
|  4th quartile  | 12.6% | 16.5% | 20.4% | 50.5% |
|  | total n | 15 358 | 15458 | 13059 | 12104 |
| **Table S2.** Percentage of women who migrate to a ward with a given ASR quartile, by the ASR of ward they emigrated from.  |

|  |  |  |
| --- | --- | --- |
|  |  | ASR of the ward moved into |
|  |  |  1st quartile  | 2nd quartile  | 3rd quartile  | 4th quartile  |
| ASR of ward moved out of |  1st quartile  | 51.8% | 22.7% | 15.5% | 10.0% |
|  2nd quartile  | 21.7% | 46.9% | 17.6% | 13.8% |
|  3rd quartile  | 17.3% | 27.0% | 41.3% | 14.4% |
|  4th quartile  | 11.3% | 15.8% | 19.6% | 53.3% |
|  | total n | 12820 | 14132 | 11841 | 11420 |
| **Table S3.** Percentage of men who migrate to a ward with a given ASR quartile, by the ASR of ward they emigrated from. |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Men  | Women  |
|  |  | n=87110 | n=95673 |
|  |  | OR (95% CI) |
| Age (years) | Age | 1.56(1.53,1.59) | 1.24(1.22,1.25) |
|  | Age squared | 1.00(1.00,1.00) | 1.00(1.00,1.00) |
| Education  | Degree | 1 | 1 |
| A-level | 1.08(0.91,1.27) | 0.95(0.83,1.09) |
| GCSE+ | 0.91(0.79,1.04) | 0.99(0.89,1.09) |
| GCSE | 1.02(0.90,1.15) | 0.85(0.77,0.94) |
| No qualifications  | 0.57(0.51,0.63) | 0.60(0.54,0.65) |
| Religion  | Catholic | 1 | 1 |
|  | Protestant | 1.09(1.04,1.14) | 1.20(1.15,1.25) |
|  | None/other | 1.44(1.26,1.64) | 1.31(1.16,1.48) |
| ASR (quartiles) | 1st quartile  | 1 | 1 |
|  | 2nd quartile | 1.27(1.09,1.49) | 1.38(1.19,1.60) |
|  | 3rd quartile | 1.12(0.96,1.30) | 1.40(1.21,1.61) |
|  | 4th quartile | 0.86(0.74,1.01) | 1.37(1.18,1.59) |
| Education\* ASR | Degree\*1st quartile | 1 | 1 |
|  | A-level\*2nd quartile | 0.74(0.59, 0.93) | 0.99(0.82,1.19) |
|  | A-level\*3rd quartile | 0.83(0.66,1.05) | 1.21(1.00,1.46) |
|  | A-level\*4th quartile | 0.94(0.74,1.19)  | 1.31(1.07,1.59) |
|  | GCSE+\*2nd quartile | 0.89(0.74,1.08) | 0.98(0.85,1.14) |
|  | GCSE+\*3rd quartile | 1.05(0.87,1.27) | 1.20(1.03,1.39) |
|  | GCSE+\*4th quartile | 1.17(0.96,1.43) | 1.41(1.20,1.65) |
|  | GCSE\*2nd quartile | 0.94(0.79,1.11) | 1.06(0.92,1.22) |
|  | GCSE\*3rd quartile | 1.03(0.87,1.22) | 1.27(1.10,1.46) |
|  | GCSE\*4th quartile | 1.03(0.87,1.22) | 1.53(1.32,1.78) |
|  | No qual.\*2nd quartile | 0.91(0.78,1.06) | 1.00(0.88,1.14) |
|  | No qual.\*3rd quartile | 1.00(0.86,1.16) | 1.19(1.04,1.35) |
|  | No qual.\*4th quartile | 1.24(1.07,1.44) | 1.49(1.30,1.71) |
| Constant |  | 0.00(0.00,0.00) | 0.01(0.01,0.02) |
| Ward variance  |  | 0.160(0.14,0.19) | 0.180(0.16,0.21) |
| AIC |  | 75361.4 | 98100.6 |
| **Table S4**. Multilevel logistic regression for cohabitation with partner, individuals clustered within wards. ASR- adult sex ratio. No qual.- no qualifications. AIC- Akaike information criterion.  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Men | Women |
|  |  | n=69,117 | n=71,685 |
|  |  | OR (95% CI) |
| Age (years) | Age | 0.86(0.85,0.88) | 0.81(0.81,0.84) |
|  | Age squared | 1.00(1.00,1.00) | 1.00(1.00,1.00) |
| Education  | Degree | 1 | 1 |
| A-level | 1.19(0.99,1.42) | 1.18(1.00,1.40) |
| GCSE+ | 1.34(1.16,1.54) | 1.27(1.12,1.45) |
| GCSE | 1.38(1.22,1.57) | 1.30(1.15,1.48) |
| No qualifications  | 1.63(1.46,1.82) | 1.64(1.46,1.83) |
| Religion  | Catholic | 1 | 1 |
|  | Protestant | 0.87(0.83,0.91) | 0.88(0.85,0.92) |
|  | None/other | 1.67(1.49,1.87) | 1.82(1.60,2.06) |
| ASR (quartiles) | 1st quartile  | 1 | 1 |
|  | 2nd quartile | 0.82(0.71,0.95) | 0.87(0.76,1.01) |
|  | 3rd quartile | 0.81(0.70,0.93) | 0.80(0.69,0.93) |
|  | 4th quartile | 0.77(0.66,0.90) | 0.69(0.59,0.81) |
| Education\* ASR | Degree\*1st quartile | 1 | 1 |
|  | A-level\*2nd quartile | 0.96(0.75,1.23) | 0.86(0.68,1.09) |
|  | A-level\*3rd quartile | 0.80(0.62,1.03) | 1.07(0.85,1.35) |
|  | A-level\*4th quartile | 0.97(0.74,1.28) | 0.90(0.70,1.16) |
|  | GCSE+\*2nd quartile | 0.95(0.78,1.16) | 0.84(0.70,1.01) |
|  | GCSE+\*3rd quartile | 0.82(0.67,1.01) | 0.89(0.74,1.07) |
|  | GCSE+\*4th quartile | 0.85(0.69,1.06) | 0.88(0.72,1.07) |
|  | GCSE\*2nd quartile | 0.97(0.81,1.16) | 0.95(0.80,1.13) |
|  | GCSE\*3rd quartile | 0.98(0.82,1.18) | 0.95(0.79,1.13) |
|  | GCSE\*4th quartile | 0.84(0.69,1.02) | 0.94(0.77,1.13) |
|  | No qual.\*2nd quartile | 0.95(0.81,1.11) | 0.93(0.79,1.09) |
|  | No qual.\*3rd quartile | 0.93(0.80,1.09) | 0.97(0.83,1.14) |
|  | No qual.\*4th quartile | 0.81(0.68,0.95) | 0.95(0.80,1.13) |
| Constant |  | 5.92(3.88,9.02) | 12.92(8.79,18.98) |
| Ward variance (SE) |  | 0.056 (1.27) | 0.040(0.01) |
| AIC |  | 65579.47 | 69414.0 |
| **Table S5**. Multilevel logistic regression for separation between 2001 and 2011. ASR- adult sex ratio. No qual.- no qualifications. AIC- Akaike information criterion. |

|  |  |  |
| --- | --- | --- |
|  |  | OR (95% CI) |
|  Father’s age (years) | Age | 1.97(1.90,2.04) |
|  | Age squared | 0.99(0.99,0.99) |
| Father’s social class  | Never worked/long-term unemployed | 1 |
| Routine occupations | 1.57(1.18,2.07) |
| Semi-routine occupations | 1.93(1.45,2.56) |
| Lower supervisory and technical occupations | 1.93(1.43,2.60) |
| Small employers and own account workers | 1.61(1.21,2.16) |
| Intermediate occupations | 2.76(2.01,3.78) |
|  | Lower managerial and professional occupations | 4.01(2.93,5.49) |
|  | Higher managerial and professional occupations | 7.83(5.23,11.72) |
| ASR (quartiles) | 1st quartile | 1 |
|  | 2nd quartile | 0.72(0.46,1.11) |
|  | 3rd quartile | 1.00(0.65,1.53) |
|  | 4th quartile | 1.38(0.88,2.18) |
| Father’s social class\* ASR | Routine \*2nd quartile | 1.54(0.96,2.48) |
|  |  \*3rd quartile | 1.52(0.96,2.41) |
|  |  \*4th quartile | 1.23(0.75,2.02) |
|  | Semi-routine \*2nd quartile | 1.62(1.00,2.62) |
|  | \*3rd quartile | 1.47(0.92,2.35) |
|  | \*4th quartile | 0.94(0.57,1.55) |
|  | Lower supervisory \*2nd quartile | 1.70(1.02,2.81) |
|  | \*3rd quartile | 1.40(0.86,2.28) |
|  | \*4th quartile | 0.94(0.56,1.56) |
|  | Small employers \*2nd quartile | 1.66(1.02,2.71) |
|  | \*3rd quartile | 1.31(0.82,2.10) |
|  | \*4th quartile | 1.12(0.68,1.83) |
|  | Intermediate \*2nd quartile | 2.02(1.19,3.43) |
|  | \*3rd quartile | 1.46(0.87,2.44) |
|  | \*4th quartile | 1.45(0.83,2.54) |
|  | Lower managerial \*2nd quartile | 1.94(1.14,3.29) |
|  |  \*3rd quartile | 1.51(0.90,2.52) |
|  | \*4th quartile | 1.07(0.62,1.85) |
|  | Higher managerial \*2nd quartile | 1.64(0.87,3.07) |
|  | \*3rd quartile | 1.16(0.63,2.13) |
|  | \*4th quartile | 0.82(0.43,1.55) |
| Constant  |  | 0.00(0.00,0.00) |
| Ward variance (SE) |  | 0.396(0.036) |
| AIC |  | 21835.07 |
| **Table S6**. Parental investment. Multilevel logistic regression for father’s cohabitation with mother of the child at child’s birth. N=28955 couples. ASR- adult sex ratio. No qual.- no qualifications. AIC- Akaike information criterion. |