**Supplementary material:** **An assessment of the utility of a Bayesian framework to improve response propensity models in longitudinal data.**

Table A1 outlines the quarterly time frames during which data collection for Understanding Society occurred across the five waves used in this analysis. Each wave's data collection spanned two years and was divided into four quarters. Table A2 presents explanatory variables controlled for in the response propensity models. Tables A3 to A5 provides coefficient estimates for final outcome’s response propensity models across waves 3, 4, and 5. While Tables A6 and A7 presents pseudo R2 coefficients, AIC, WAIC, sensitivity and specificity values for a random subsample of 10% of the main sample.

Table A1: Timetable for Understanding Society survey data collection for Wave 1 to 5 by quarter (Q) 2009-2014

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Wave 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | Wave 2 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  | Wave 3 |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  | Wave 4 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Wave 5 |
| A year is made up of four quarters: January-March is (Q1); April-June is (Q2); July-September is (Q3); and October-December is (Q4) |

Table A2: Explanatory variables and corresponding categorical levels controlled for in the response propensity models.

|  |  |  |
| --- | --- | --- |
| Grouping | Variable name | Categorical levels |
| Geographical Information andDesign Variables | Government Office Region | East Midlands (reference) |
| East of England |
| London |
| Northeast |
| Northwest |
| Scotland |
| Southeast |
| Southwest |
| Wales |
| West Midlands |
| Yorkshire and the Humber |
| Urban indicator | Urban(reference) |
| Rural |
| Month and year of household issues | January-June Year 1 (reference) |
| July-December Year 1 |
| January-June Year 2 |
| July- December Year 2 |
| Survey Variables | Lone parents | lone parents in household (reference) |
|  | no lone parents in household |
| Pensioners in household | no pension age people in household (reference) |
| pension age people in household |
| Employment status | employed people in household (reference) |
| No employed people in household |
| Number of cars | no car (Reference) |
| one car |
| two car |
| three or more car |
| Highest education qualification | Higher degree & Degree (reference) |
| A level & GCSE |
| Others or no qualification |
| Household income | 1st Quartile (reference) |
| 2nd Quartile |
| 3rd Quartile |
| 4th Quartile |
| Tenure | Owned (reference) |
| Rented from employer privately and other |
| Rented from LA or housing association |
| Household size | One person (reference) |
| 2 to 3 persons |
| More than 4 persons |
| Interviewer observations | Type of accommodation/dwelling type | house/bungalow (reference) |
| flat/maisonette |
| other |
| Relative condition of property | Mainly good (reference) |
| Mainly fair |
| Mainly bad and others |
| Presence of unkempt garden in address | yes (Reference) |
| no |
| No obvious garden |
| Don’t know |
| Condition of surrounding houses (vicinity 1) | Mentioned (reference) |
| Not mentioned |
| Trash, litter or junk in street or road (vicinity 2) | Mentioned (reference) |
| Not mentioned |
| Heavy traffic on street or road (Vicinity 3) | Mentioned (reference) |
| Not mentioned |
| Presence of car or van | No (reference) |
| yes, probably belonging to this address |
| yes, unsure whether belonging to this address |
| don't know |
| Presence of children in a household | children in household (reference) |
| no children in household |
| Call record variables | Length of call sequence | short (Reference) |
| long |
| Proportion of noncontacts | 0-25% (Reference) |
| 26-50% |
| 51-75% |
| 76-100% |
| Proportion of appointments | 0-25% (Reference) |
| 26-50% |
| 51-100% |
| Proportion of contact calls | 0-25% (Reference) |
| 26-50% |
| 51-75% |
| 76-100% |
| Proportion of other call outcomes (ineligibles and refusals) | 0-25% (Reference) |
| 26-50% |
| 51-75% |
| Any other status |
| Proportion of interviews | 0-25% (Reference) |
| 26-50% |
| 51-75% |
| 76-100% |

Tables A3 to A5 provides coefficient estimates for final outcome’s response propensity models across waves 3, 4, and 5. While Tables A6 and A7 presents pseudo R2 coefficients, AIC, WAIC, sensitivity and specificity values for a random subsample of 10% of the main sample.

Table A3: Posterior coefficient estimates for wave 3 in final call outcome in uninformative prior (M1) and informative priors (M2, M3 and M7) models.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  **M1**  |  **M2** |  **M3** |  **M7** |
| *Mean* | *SD* | *Mean*  | *SD* | *Mean*  | *SD* | *Mean*  | *SD* |
|  | Intercept  | 2.23 | 0.23 | 1.80 | 0.15 | 1.96 | 0.19 | 2.07 | 0.21 |
| Government Office Region  | East Midlands (reference) |  |  |  |  |  |  |  |  |
| East of England | -0.19 | 0.14 | 0.05 | 0.07 | 0.01 | 0.10 | -0.06 | 0.11 |
| London | -0.44 | 0.14 | -0.12 | 0.07 | -0.22 | 0.10 | -0.30 | 0.11 |
| Northeast | -0.21 | 0.16 | 0.03 | 0.09 | -0.01 | 0.12 | -0.08 | 0.14 |
| Northwest | -0.22 | 0.13 | 0.03 | 0.07 | -0.02 | 0.09 | -0.09 | 0.11 |
| Scotland  | -0.55 | 0.14 | -0.16 | 0.07 | -0.30 | 0.10 | -0.39 | 0.11 |
| Southeast | -0.39 | 0.13 | -0.08 | 0.07 | -0.17 | 0.09 | -0.25 | 0.10 |
| Southwest | -0.15 | 0.14 | 0.08 | 0.08 | 0.04 | 0.10 | -0.02 | 0.12 |
| Wales | -0.26 | 0.16 | 0.01 | 0.08 | -0.05 | 0.11 | -0.12 | 0.13 |
| West Midlands | -0.23 | 0.14 | 0.02 | 0.07 | -0.03 | 0.10 | -0.10 | 0.11 |
| Yorkshire and the Humber | -0.22 | 0.14 | 0.03 | 0.08 | -0.02 | 0.10 | -0.09 | 0.12 |
| Rural/Urban | Urban (Reference) |  |  |  |  |  |  |  |  |
| Rural | 0.04 | 0.07 | 0.06 | 0.06 | 0.05 | 0.07 | 0.05 | 0.07 |
| Month  | January-June Year 1 (reference) |  |  |  |  |  |  |  |  |
| July-December Year 1 | 0.06 | 0.08 | 0.00 | 0.06 | 0.03 | 0.07 | 0.05 | 0.07 |
| January-June Year 2 | 0.17 | 0.08 | 0.09 | 0.06 | 0.13 | 0.07 | 0.15 | 0.07 |
| July- December Year 2 | 0.39 | 0.08 | 0.25 | 0.06 | 0.34 | 0.07 | 0.37 | 0.08 |
| Pension age  | no pension age people in HH |  |  |  |  |  |  |  |  |
| pension age people in HH | 0.21 | 0.08 | 0.14 | 0.06 | 0.18 | 0.07 | 0.20 | 0.08 |
| Employed | employed people in HH |  |  |  |  |  |  |  |  |
| No employed people in HH | -0.08 | 0.08 | -0.03 | 0.06 | -0.06 | 0.08 | -0.07 | 0.08 |
| Highest educational qualification in the household | Higher degree & Degree (reference) |  |  |  |  |  |  |  |  |
| A level & GCSE | -0.24 | 0.07 | -0.13 | 0.05 | -0.20 | 0.06 | -0.22 | 0.06 |
| Other & No qualification | -0.43 | 0.09 | -0.23 | 0.07 | -0.35 | 0.08 | -0.40 | 0.09 |
| Income | 1st Quartile (Reference) |  |  |  |  |  |  |  |  |
| 2nd Quartile | 0.02 | 0.09 | 0.04 | 0.06 | 0.03 | 0.08 | 0.02 | 0.08 |
| 3rd Quartile | -0.10 | 0.10 | -0.02 | 0.06 | -0.06 | 0.08 | -0.08 | 0.09 |
| 4th Quartile | -0.17 | 0.11 | -0.05 | 0.07 | -0.12 | 0.09 | -0.15 | 0.10 |
| Tenure | Owned |  |  |  |  |  |  |  |  |
| Rented from employer privately and other | -0.60 | 0.08 | -0.41 | 0.07 | -0.54 | 0.08 | -0.58 | 0.08 |
| Rented from LA or housing association | -0.06 | 0.09 | -0.05 | 0.06 | -0.07 | 0.08 | -0.07 | 0.08 |
| Dwelling type | house/bungalow (reference) |  |  |  |  |  |  |  |  |
| flat/maisonette | -0.02 | 0.09 | -0.05 | 0.07 | -0.04 | 0.08 | -0.03 | 0.09 |
| other | -0.21 | 0.24 | -0.03 | 0.10 | -0.10 | 0.17 | -0.15 | 0.21 |
| Children | children in HH(Reference) |  |  |  |  |  |  |  |  |
|  | no children in HH | -0.19 | 0.08 | -0.06 | 0.06 | -0.13 | 0.07 | -0.16 | 0.08 |
| Number of cars | no car (Reference) |  |  |  |  |  |  |  |  |
| one car | 0.22 | 0.08 | 0.15 | 0.06 | 0.19 | 0.07 | 0.21 | 0.08 |
| two cars | 0.24 | 0.10 | 0.15 | 0.07 | 0.20 | 0.09 | 0.22 | 0.10 |
| three or more car | 0.17 | 0.14 | 0.04 | 0.08 | 0.10 | 0.11 | 0.13 | 0.13 |
| Household size  | One person |  |  |  |  |  |  |  |  |
| 2 to 3 persons | -0.22 | 0.08 | -0.10 | 0.06 | -0.17 | 0.07 | -0.20 | 0.08 |
| More than 4 people | -0.23 | 0.12 | -0.05 | 0.07 | -0.15 | 0.10 | -0.19 | 0.11 |
| Proportion of other call outcomes | 0-25% (Reference) |  |  |  |  |  |  |  |  |
| 26-50% | -0.07 | 0.22 | -0.03 | 0.10 | -0.06 | 0.16 | -0.07 | 0.19 |
| 51-75% | 0.11 | 0.59 | 0.02 | 0.11 | 0.03 | 0.21 | 0.05 | 0.31 |
| Any other status | 0.27 | 0.13 | 0.15 | 0.08 | 0.21 | 0.11 | 0.23 | 0.12 |
| Proportion of Contacts | 0-25% (Reference) |  |  |  |  |  |  |  |  |
| 26-50% | -0.28 | 0.08 | -0.17 | 0.07 | -0.23 | 0.08 | -0.26 | 0.08 |
| 51-75% | -0.58 | 0.24 | -0.07 | 0.10 | -0.24 | 0.17 | -0.39 | 0.21 |
| 76-100% | -0.27 | 0.86 | 0.02 | 0.11 | 0.00 | 0.22 | -0.02 | 0.34 |
| Proportion of appointments  | 0-25% |  |  |  |  |  |  |  |  |
| 26-50% | -0.08 | 0.07 | -0.02 | 0.05 | -0.04 | 0.06 | -0.06 | 0.06 |
| 51-100% | -0.37 | 0.22 | -0.05 | 0.10 | -0.17 | 0.16 | -0.26 | 0.19 |
| Proportion of noncontacts  | 0-25% (Reference) |  |  |  |  |  |  |  |  |
| 26-50% | 0.00 | 0.07 | 0.04 | 0.05 | 0.03 | 0.06 | 0.02 | 0.07 |
| 51-75% | -0.05 | 0.11 | 0.02 | 0.07 | 0.00 | 0.09 | -0.02 | 0.10 |
| 76-100% | 0.14 | 0.19 | 0.11 | 0.09 | 0.16 | 0.14 | 0.16 | 0.16 |
| Call length | short (Reference) |  |  |  |  |  |  |  |  |
| long | -0.07 | 0.01 | -0.08 | 0.01 | -0.08 | 0.01 | -0.07 | 0.01 |

Table A4: Posterior coefficient estimates for wave 4 in final call outcome in uninformative prior (M1) and informative priors (M2, M3 and M7) models.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  **M1**  |  **M2** |  **M3** |  **M7** |
| *Mean* | *SD* | *Mean*  | *SD* | *Mean* | *SD* | *Mean* | *SD*  |
|  | Intercept  | 1.85 | 0.26 | 1.94 | 0.15 | 1.91 | 0.20 | 1.90 | 0.23 |
| Government Office Region  | East Midlands (reference) |  |  |  |  |  |  |  |  |
| East of England | 0.09 | 0.15 | 0.07 | 0.07 | 0.09 | 0.10 | 0.09 | 0.12 |
| London | -0.05 | 0.15 | -0.05 | 0.07 | -0.06 | 0.10 | -0.06 | 0.12 |
| Northeast | -0.07 | 0.18 | -0.02 | 0.08 | -0.04 | 0.12 | -0.05 | 0.14 |
| Northwest | -0.02 | 0.14 | 0.00 | 0.07 | -0.01 | 0.10 | -0.01 | 0.11 |
| Scotland  | -0.16 | 0.15 | -0.06 | 0.08 | -0.11 | 0.10 | -0.14 | 0.12 |
| Southeast | -0.10 | 0.14 | -0.04 | 0.07 | -0.07 | 0.09 | -0.08 | 0.11 |
| Southwest | 0.21 | 0.16 | 0.11 | 0.08 | 0.17 | 0.11 | 0.19 | 0.13 |
| Wales | 0.21 | 0.18 | 0.09 | 0.08 | 0.15 | 0.12 | 0.19 | 0.15 |
| West Midlands | -0.08 | 0.15 | -0.02 | 0.07 | -0.05 | 0.10 | -0.06 | 0.12 |
| Yorkshire and the Humber | -0.07 | 0.15 | -0.02 | 0.07 | -0.05 | 0.10 | -0.06 | 0.12 |
| Rural/Urban | Urban (Reference) |  |  |  |  |  |  |  |  |
| Rural | 0.21 | 0.09 | 0.16 | 0.06 | 0.20 | 0.08 | 0.21 | 0.08 |
| Month  | January-June Year 1 (reference) |  |  |  |  |  |  |  |  |
| July-December Year 1 | 0.11 | 0.09 | 0.03 | 0.06 | 0.07 | 0.08 | 0.09 | 0.08 |
| January-June Year 2 | 0.15 | 0.09 | 0.06 | 0.06 | 0.11 | 0.08 | 0.14 | 0.08 |
| July- December Year 2 | 0.20 | 0.09 | 0.10 | 0.06 | 0.15 | 0.08 | 0.18 | 0.09 |
| Pension age  | no pension age people in HH |  |  |  |  |  |  |  |  |
| pension age people in HH | 0.02 | 0.09 | 0.04 | 0.06 | 0.03 | 0.08 | 0.02 | 0.09 |
| Employed | employed people in HH |  |  |  |  |  |  |  |  |
| No employed people in HH | 0.10 | 0.10 | 0.02 | 0.06 | 0.06 | 0.08 | 0.08 | 0.09 |
| Highest educational qualification in the household | Higher degree & Degree (reference) |  |  |  |  |  |  |  |  |
| A level & GCSE | -0.22 | 0.08 | -0.10 | 0.06 | -0.17 | 0.07 | -0.20 | 0.07 |
| Other & No qualification | -0.50 | 0.10 | -0.24 | 0.07 | -0.39 | 0.09 | -0.45 | 0.10 |
| Income | 1st Quartile (Reference) |  |  |  |  |  |  |  |  |
| 2nd Quartile | 0.03 | 0.10 | 0.02 | 0.06 | 0.02 | 0.08 | 0.02 | 0.09 |
| 3rd Quartile | 0.00 | 0.12 | 0.03 | 0.07 | 0.01 | 0.09 | 0.01 | 0.10 |
| 4th Quartile | -0.11 | 0.13 | -0.01 | 0.07 | -0.06 | 0.10 | -0.09 | 0.11 |
| Tenure | Owned |  |  |  |  |  |  |  |  |
| Rented from employer privately and other | -0.40 | 0.10 | -0.24 | 0.07 | -0.36 | 0.09 | -0.39 | 0.09 |
| Rented from LA or housing association | -0.09 | 0.10 | -0.11 | 0.06 | -0.12 | 0.08 | -0.11 | 0.09 |
| Dwelling type | house/bungalow (reference) |  |  |  |  |  |  |  |  |
| flat/maisonette | -0.13 | 0.10 | -0.11 | 0.07 | -0.12 | 0.09 | -0.12 | 0.09 |
| other | -0.66 | 0.26 | -0.07 | 0.09 | -0.23 | 0.16 | -0.40 | 0.21 |
| Children | children in HH(Reference) |  |  |  |  |  |  |  |  |
|  | no children in HH | -0.09 | 0.10 | 0.02 | 0.06 | -0.02 | 0.08 | -0.05 | 0.09 |
| Number of cars | no car (Reference) |  |  |  |  |  |  |  |  |
| one car | 0.47 | 0.09 | 0.22 | 0.06 | 0.34 | 0.08 | 0.41 | 0.08 |
| two cars | 0.61 | 0.12 | 0.24 | 0.07 | 0.40 | 0.09 | 0.50 | 0.11 |
| three or more cars | 0.36 | 0.16 | 0.03 | 0.08 | 0.13 | 0.12 | 0.23 | 0.14 |
| Household size  | One person |  |  |  |  |  |  |  |  |
| 2 to 3 persons | -0.31 | 0.10 | -0.05 | 0.06 | -0.16 | 0.08 | -0.23 | 0.09 |
| More than 4 people | -0.48 | 0.14 | -0.10 | 0.07 | -0.25 | 0.11 | -0.36 | 0.13 |
| Proportion of other call outcomes | 0-25% (Reference) |  |  |  |  |  |  |  |  |
| 26-50% | 0.23 | 0.24 | 0.00 | 0.09 | 0.04 | 0.15 | 0.11 | 0.19 |
| 51-75% | 0.64 | 0.77 | 0.02 | 0.10 | 0.05 | 0.19 | 0.11 | 0.29 |
| Any other status | 0.36 | 0.14 | 0.13 | 0.08 | 0.22 | 0.11 | 0.27 | 0.12 |
| Proportion of Contacts | 0-25% (Reference) |  |  |  |  |  |  |  |  |
| 26-50% | -0.19 | 0.10 | -0.10 | 0.07 | -0.15 | 0.09 | -0.17 | 0.10 |
| 51-75% | -0.28 | 0.30 | -0.02 | 0.09 | -0.08 | 0.17 | -0.15 | 0.22 |
| 76-100% | 4.84 | 13.04 | 0.02 | 0.10 | 0.03 | 0.20 | 0.06 | 0.32 |
| Proportion of appointments  | 0-25% |  |  |  |  |  |  |  |  |
| 26-50% | 0.09 | 0.08 | 0.09 | 0.06 | 0.10 | 0.07 | 0.10 | 0.07 |
| 51-100% | 0.15 | 0.29 | 0.02 | 0.09 | 0.06 | 0.16 | 0.09 | 0.21 |
| Proportion of noncontacts  | 0-25% (Reference) |  |  |  |  |  |  |  |  |
| 26-50% | 0.00 | 0.08 | 0.02 | 0.06 | 0.02 | 0.07 | 0.01 | 0.08 |
| 51-75% | 0.00 | 0.13 | 0.04 | 0.07 | 0.04 | 0.10 | 0.03 | 0.11 |
| 76-100% | -0.10 | 0.20 | 0.02 | 0.09 | 0.00 | 0.14 | -0.04 | 0.17 |
| Call length | short (Reference) |  |  |  |  |  |  |  |  |
| long | -0.08 | 0.02 | -0.09 | 0.01 | -0.09 | 0.01 | -0.08 | 0.01 |

Table A5: Posterior coefficient estimates for wave 5 in final call outcome in uninformative prior (M1) and informative priors (M2, M3 and M7) models.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Fixed Effects** |  **M1**  |  **M2** |  **M3** |  **M7** |
| *Mean* | *SD* | *Mean*  | *SD* | Mean | *SD* | *Mean* | *SD*  |
|  | Intercept  | 2.65 | 0.30 | 1.91 | 0.16 | 2.15 | 0.22 | 2.34 | 0.25 |
| Government Office Region  | East Midlands (reference) |  |  |  |  |  |  |  |  |
| East of England | -0.37 | 0.17 | 0.03 | 0.08 | -0.06 | 0.11 | -0.14 | 0.13 |
| London | -0.27 | 0.18 | 0.05 | 0.08 | 0.00 | 0.12 | -0.06 | 0.14 |
| Northeast | -0.29 | 0.21 | 0.08 | 0.09 | 0.03 | 0.14 | -0.05 | 0.17 |
| Northwest | -0.35 | 0.17 | 0.03 | 0.08 | -0.05 | 0.11 | -0.13 | 0.13 |
| Scotland  | -0.32 | 0.18 | 0.06 | 0.08 | -0.01 | 0.12 | -0.09 | 0.14 |
| Southeast | -0.23 | 0.17 | 0.11 | 0.08 | 0.06 | 0.11 | -0.01 | 0.13 |
| Southwest | -0.18 | 0.18 | 0.12 | 0.08 | 0.10 | 0.12 | 0.03 | 0.14 |
| Wales | -0.66 | 0.19 | -0.08 | 0.09 | -0.27 | 0.13 | -0.40 | 0.15 |
| West Midlands | -0.23 | 0.18 | 0.10 | 0.08 | 0.06 | 0.12 | -0.01 | 0.14 |
| Yorkshire and the Humber | -0.07 | 0.18 | 0.15 | 0.08 | 0.16 | 0.12 | 0.11 | 0.14 |
| Rural/Urban | Urban (Reference) |  |  |  |  |  |  |  |  |
| Rural | -0.02 | 0.09 | 0.04 | 0.07 | 0.04 | 0.07 | -0.01 | 0.09 |
| Month  | January-June Year 1 (reference) |  |  |  |  |  |  |  |  |
| July-December Year 1 | -0.10 | 0.10 | -0.02 | 0.07 | -0.06 | 0.09 | -0.08 | 0.09 |
| January-June Year 2 | 0.17 | 0.10 | 0.17 | 0.07 | 0.18 | 0.09 | 0.18 | 0.10 |
| July- December Year 2 | -0.07 | 0.10 | 0.00 | 0.07 | -0.04 | 0.09 | -0.06 | 0.10 |
| Pension age  | no pension age people in HH |  |  |  |  |  |  |  |  |
| pension age people in HH | 0.13 | 0.10 | 0.13 | 0.07 | 0.13 | 0.09 | 0.13 | 0.10 |
| Employed | employed people in HH |  |  |  |  |  |  |  |  |
| No employed people in HH | 0.06 | 0.11 | 0.08 | 0.07 | 0.08 | 0.09 | 0.08 | 0.10 |
| Highest educational qualification in the household | Higher degree & Degree (reference) |  |  |  |  |  |  |  |  |
| A level & GCSE | -0.20 | 0.08 | -0.09 | 0.06 | -0.15 | 0.08 | -0.18 | 0.08 |
| Other & No qualification | -0.14 | 0.12 | 0.00 | 0.08 | -0.08 | 0.10 | -0.11 | 0.11 |
| Income | 1st Quartile (Reference) |  |  |  |  |  |  |  |  |
| 2nd Quartile | -0.20 | 0.12 | -0.03 | 0.07 | -0.10 | 0.09 | -0.15 | 0.10 |
| 3rd Quartile | -0.18 | 0.13 | 0.03 | 0.07 | -0.06 | 0.10 | -0.12 | 0.12 |
| 4th Quartile | -0.20 | 0.15 | 0.08 | 0.08 | -0.03 | 0.11 | -0.11 | 0.13 |
| Tenure | Owned |  |  |  |  |  |  |  |  |
| Rented from employer privately and other | -0.49 | 0.11 | -0.19 | 0.08 | -0.19 | 0.08 | -0.44 | 0.10 |
| Rented from LA or housing association | -0.29 | 0.11 | -0.13 | 0.07 | -0.13 | 0.07 | -0.27 | 0.10 |
| Dwelling type | house/bungalow (reference) |  |  |  |  |  |  |  |  |
| flat/maisonette | 0.11 | 0.12 | 0.04 | 0.08 | 0.06 | 0.10 | 0.08 | 0.11 |
| other | 0.15 | 0.30 | 0.08 | 0.10 | 0.09 | 0.18 | 0.11 | 0.23 |
| Children | children in HH(Reference) |  |  |  |  |  |  |  |  |
|  | no children in HH | -0.18 | 0.11 | 0.01 | 0.07 | -0.07 | 0.09 | -0.13 | 0.10 |
| Number of cars | no car (Reference) |  |  |  |  |  |  |  |  |
| one car | 0.52 | 0.10 | 0.29 | 0.07 | 0.39 | 0.08 | 0.45 | 0.09 |
| two cars | 0.43 | 0.13 | 0.18 | 0.07 | 0.28 | 0.10 | 0.35 | 0.12 |
| three or more cars | 0.48 | 0.18 | 0.14 | 0.09 | 0.25 | 0.13 | 0.35 | 0.16 |
| Household size  | One person |  |  |  |  |  |  |  |  |
| 2 to 3 persons | -0.17 | 0.11 | -0.01 | 0.07 | -0.08 | 0.09 | -0.13 | 0.10 |
| More than 4 people | -0.23 | 0.16 | 0.02 | 0.08 | -0.09 | 0.12 | -0.16 | 0.14 |
| Proportion of other call outcomes | 0-25% (Reference) |  |  |  |  |  |  |  |  |
| 26-50% | -0.19 | 0.28 | 0.02 | 0.10 | -0.07 | 0.17 | -0.13 | 0.22 |
| 51-75% | 0.09 | 0.79 | 0.09 | 0.11 | 0.10 | 0.21 | 0.10 | 0.33 |
| Any other status | 0.44 | 0.18 | 0.20 | 0.09 | 0.29 | 0.13 | 0.35 | 0.15 |
| Proportion of Contacts | 0-25% (Reference) |  |  |  |  |  |  |  |  |
| 26-50% | -0.56 | 0.11 | -0.16 | 0.08 | -0.32 | 0.09 | -0.42 | 0.10 |
| 51-75% | -0.76 | 0.32 | 0.04 | 0.10 | -0.09 | 0.18 | -0.29 | 0.25 |
| 76-100% | -2.09 | 0.63 | 0.05 | 0.11 | -0.08 | 0.21 | -0.34 | 0.33 |
| Proportion of appointments  | 0-25% |  |  |  |  |  |  |  |  |
| 26-50% | -0.14 | 0.09 | 0.07 | 0.06 | 0.01 | 0.08 | -0.04 | 0.08 |
| 51-100% | -0.82 | 0.25 | 0.00 | 0.10 | -0.21 | 0.17 | -0.44 | 0.21 |
| Proportion of noncontacts  | 0-25% (Reference) |  |  |  |  |  |  |  |  |
| 26-50% | -0.20 | 0.09 | 0.03 | 0.06 | -0.03 | 0.08 | -0.09 | 0.08 |
| 51-75% | -0.12 | 0.15 | 0.19 | 0.08 | 0.17 | 0.12 | 0.08 | 0.13 |
| 76-100% | -0.93 | 0.22 | -0.05 | 0.10 | -0.30 | 0.15 | -0.54 | 0.18 |
| Call length | short (Reference) |  |  |  |  |  |  |  |  |
| long | -0.07 | 0.02 | -0.11 | 0.01 | -0.10 | 0.02 | -0.09 | 0.02 |

Table A6: Evaluation criteria for frequentist and Bayesian models (Akaike information Criteria (AIC), Nagelkerke’s pseudo $R^{2}$ and Watanabe Akaike Information Criteria (WAIC)) in a subsample consisting of 10% of individuals in main sample.

|  |  |  |  |
| --- | --- | --- | --- |
| Wave | Model | Final call outcome |  Length of call sequence  |
| *AIC* | *Nagelkerke R2 (%)* | *WAIC* | *AIC* | *Nagelkerke R2 (%)* | *WAIC* |
| 1 and 2 | frequentist | 1221.1 | 8.31 | - | 865.4 | 11.9 | - |
| M1 | - | - | 1221.85 | - | - | 865.28 |
| 2 and 3 | frequentist | 952.77 | 3.98 |  | 697.4 | 10.2 |  |
| M1 | - | - | 953.56 | - | - | 697.77 |
| M2 | - | - | 937.58 | - | - | 691.81 |
| M3 |  |  | 944.33 | - | - | 786.32 |
| M4 | - | - | 941.67 | - | - | 693.94 |
| M5 | - | - | 948.95 | - | - | 696.81 |
| M6 | - | - | 952.06 | - | - | 697.51 |
| M7 | - | - | 953.55 | - | - | 697.77 |
| 3 and 4 | frequentist | 686.41 | 6.49 |  | 557.08 | 12.26 |  |
| M1 |  |  | 687.91 | - | - | 557.41 |
| M2 |  |  | 677.94 | - | - | 558.23 |
| M3 |  |  | 703.00 | - | - | 714.22 |
| M4 |  |  | 675.92 | - | - | 554.34 |
| M5 | - | - | 676.38 | - | - | 555.73 |
| M6 | - | - | 676.23 | - | - | 556.88 |
| M7 | - | - | 684.05 | - | - | 557.41 |
| 4 and 5 | frequentist | 556.2 | 11.08 | - |  |  | - |
|  | M1 | - | - | 557.96 | - | - | 516.16 |
| M2 | - | - | 544.63 | - | - | 513.04 |
| M3 | - |  | 545.42 | - | - | 512.80 |
| M4 | - | - | 544.48 | - | - | 512.80 |
| M5 | - | - | 550.20 | - | - | 515.01 |
| M6 | - | - | 554.75 | - | - | 515.82 |
| M7 | - | - | 557.93 | - | - | 516.65 |

Table A7: Classification table and AUC of ROC curves for the final call outcome in a subsample consisting of 10% of individuals in main sample.

|  |  |  |
| --- | --- | --- |
| **Wave** | **Modelling approach** | **Final call outcome** |
| *Classification (%)* | *AUC* *(%)* |
| 1 and 2 | frequentist | 78.1 | 64.6 |
| M1 | 78.0 | 64.6 |
| 2 and 3 | frequentist | 80.8 | 59.2 |
| M1 | 80.8 | 59.2 |
| M2 | 80.8 | 56.4 |
| M3 | 80.8 | 55.1 |
| M4 | 80.8 | 58.1 |
| M5 | 80.8 | 59.1 |
| M6 | 80.8 | 59.1 |
| M7 | 80.8 | 59.2 |
| 3 and 4 | frequentist | 86.8 | 62.0 |
| M1 | 86.8 | 61.9 |
| M2 | 86.8 | 61.9 |
| M3 | 86.3 | 61.3 |
| M4 | 86.6 | 62.9 |
| M5 | 86.6 | 62.4 |
| M6 | 86.6 | 62.1 |
| M7 | 86.8 | 61.9 |
| 4 and 5 | frequentist | 88.0 | 64.4 |
| M1 | 88.0 | 64.4 |
| M2 | 88.0 | 60.9 |
| M3 | 87.7 | 58.7 |
| M4 | 87.7 | 63.5 |
| M5 | 87.7 | 64.5 |
| M6 | 87.7 | 64.3 |
| M7 | 88.0 | 64.4 |

Table A8: Evaluation criteria for frequentist and Bayesian models (Akaike information Criteria (AIC), Nagelkerke’s pseudo $R^{2}$ and Watanabe Akaike Information Criteria (WAIC)) for employment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Wave | Model | AIC | Nagelkerke R2 (%) | WAIC |
| 2 | frequentist | 10195.0 | 45.3 | - |
| M1 | - | - | 10915.1 |
| 3 | frequentist | 8860.0 | 42.2 | - |
| M1 | - | - | 8860.0 |
| M2 | - | - | 9416.7 |
| M3 | - | - | 9030.7 |
| M4 | - | - | 8922.3 |
| M5 | - | - | 8872.6 |
| M6 | - | - | 9187.7 |
|  | M7 | - | - | 9030.7 |
| 4 | frequentist | 8183.9 | 41.0 | - |
| M1 | - | - | 8183.9 |
| M2 | - | - | 8575.3 |
| M3 | - | - | 8292.1 |
| M4 | - | - | 8190.9 |
| M5 | - | - | 8402.2 |
| M6 | - | - | 8328.6 |
| M7 | - | - | 8240.5 |

Table A9: Results of sensitivity, specificity, positive predictive values (PPV) and negative predictive values (NPV) of employment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Wave | Model | Sensitivity | Specificity | PPV | NPV |
| 2 | frequentist | 79.0 | 79.0 | 55.0 | 92.0 |
| M1 | 79.0 | 79.0 | 55.0 | 92.0 |
| 3 | frequentist | 76.0 | 78.0 | 53.0 | 91.0 |
| M1 | 76.0 | 78.0 | 53.0 | 91.0 |
| M2 | 76.0 | 78.0 | 53.0 | 91.0 |
| M3 | 76.0 | 78.0 | 53.0 | 91.0 |
| M4 | 76.0 | 78.0 | 53.0 | 91.0 |
| M5 | 76.0 | 78.0 | 53.0 | 91.0 |
| M6 | 76.0 | 78.0 | 53.0 | 91.0 |
| M7 | 76.0 | 78.0 | 53.0 | 91.0 |
| 4 | frequentist | 75.0 | 78.0 | 54.0 | 90.0 |
| M1 | 75.0 | 78.0 | 54.0 | 90.0 |
| M2 | 75.0 | 78.0 | 54.0 | 90.0 |
| M3 | 75.0 | 78.0 | 54.0 | 90.0 |
| M4 | 75.0 | 78.0 | 54.0 | 90.0 |
| M5 | 75.0 | 78.0 | 54.0 | 90.0 |
| M6 | 75.0 | 78.0 | 54.0 | 90.0 |
| M7 | 75.0 | 78.0 | 54.0 | 90.0 |