Recitation 3 Randomization

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Since we have an extra week for this problem set, I will set up the labs in two parts. The first part is mostly dealing with data manipulation and visualization and the second part with randomization. Wednesday and Friday will cover randomization in depth and William is obviously better suited to introduce that information than I. Next Tuesday we will revisit it with some examples in lab.

Today, I will walk you through how to approach a dataset you are interested in working with and exploring what it holds. For today, we will be using Afrobarometer's Round 7 data. Afrobarometer is a public attitudes survey conducted across Sub-Saharan Africa every few years. I have quite a bit of experience with Afrobarometer data, though I have not used round 7 yet. The first step is to find out what format the data are stored in and find a way to easily access and read the data contained. Once you do that, it can be a good idea to write the data into a more universal file format. Some people save as .txt, though I prefer .csv.

These data are in .sav and unless you have SPSS on your computer or want to make a trip to the lab just to see the data, I recommend using the foreign package in R to read SPSS files and then save them in a better format. The two commands after the file name are useful for reading data. The use.value.labels turns those labels into factors, which is helpful for things like regions and countries but I prefer to have them as FALSE since it keeps. The to.data.frame prevents the reading as coming from a list and then needing to further manipulate it into a more readily-accessible object. Note, reading this way can take some time, even with relatively small, about 50k datasets.

Once we have the data, it is a good idea to check out what the structure is and what the data look like. This is also a good time to keep the codebook (assuming one accompanies the dataset, which is not always true) handy and look through the variables of interest to you. Further, make sure to keep an eye for alternative variables and potential robustness checks that someone may ask you to run to strengthen your argument. I am about to limit the data severely for time purposes, but it is typically not a good idea to do this, you want to keep as much data as possible.

Now that we have a limited number of variables we may be interested in, we should check their codings.

Next, we will create some visualizations of the data and see what our distributions are. For this, I think using ggarange or multiplot are useful tools. That way, we can create plots in bulk and visualize about 6 at a time.

```
##  [1] "id"                  "country"             "urbrur"
##  [4] "region"              "age"                 "language"
##  [7] "religion"            "education"           "party_id"
## [10] "party_election_pref" "ethnic_id"           "nat_eth_id"
## [13] "current_direction"   "personal_econ_cond"
```

```
##
##     1     2     3   460
## 19828 25308   647    40
```

```
##
##   18   19   20   21   22   23   24   25   26   27   28   29   30   31   32   33
## 1540 1492 1672 1242 1557 1374 1260 2031 1275 1334 1522 1121 2007  870 1443  924
##   34   35   36   37   38   39   40   41   42   43   44   45   46   47   48   49
##  809 1589  974  817 1059  736 1479  590  971  578  502 1214  494  585  661  432
##   50   51   52   53   54   55   56   57   58   59   60   61   62   63   64   65
##  925  375  700  458  431  585  443  334  438  308  683  248  333  296  225  414
##   66   67   68   69   70   71   72   73   74   75   76   77   78   79   80   81
##  183  239  207  147  350  114  141   95   95  141   70   79   93   45  112   30
##   82   83   84   85   86   87   88   89   90   91   92   93   94   95   96   97
##   44   38   31   57   19   18   15    7   17    2    6    4    4    9    2    1
##   98   99  103  106  998  999
##    4    5    1    2    9   37
```

```
##
##   -1    1    2    3    4  100  101  102  103  104  105  106  107  108  109  110
##   16  445  142 1425  377  182   94   53   37  416   78  142   25   16   17   19
##  140  141  142  143  144  145  146  147  148  149  150  152  180  181  182  183
##  924   13   58    2  110    7    8    8    1    9    4   11  646   24   82   87
##  184  185  186  187  188  189  190  191  192  193  194  195  196  197  198  199
##   66   27    7   40   18    3    1    1    2   22    8   35   23    5   16    9
##  200  220  221  260  261  262  263  264  265  266  267  268  269  270  271  272
##   11 1192    5 1233  333  205  110   99   16   16   12   12   31   26   35   36
##  273  300  301  302  303  304  305  306  307  308  309  310  311  312  340  341
##   11  293  182  218  185  153   96  109   43   54    8   85   14   34 1181    3
##  342  380  381  382  383  384  385  386  387  388  389  390  391  392  393  394
##    9  175    3    4   33   94   57  111   50  271   43   68   80   13  100   13
##  395  396  420  421  422  460  461  462  463  464  465  466  467  468  470  471
##   60    1  473  726    1  152    9   11  583  130   56  145   61   27    1   10
##  500  501  502  503  504  505  507  508  509  510  511  512  513  515  516  517
##   20  606    4   26   25   98    2   17   70   11   39   10   73   26   68   57
##  518  540  541  542  543  544  545  546  547  548  549  550  551  552  553  554
##   31  654  231   99  297   16   55   33   47  103   34  106   17   90   16  113
##  555  556  557  558  559  560  580  581  582  583  584  585  586  587  588  589
##   44    5   31   19   12   27   90    8  164  583  118   75   28   12   19    4
##  590  620  621  622  624  625  626  627  628  629  630  631  632  633  634  635
##   34  373  262  318   23   20   56   13   31   32   24   21   36   17   19   10
##  636  637  638  639  640  641  642  643  644  645  660  661  662  663  664  665
##   16    6   23   19    6    1   15   15   11   19  553  293  153   73   22   51
##  666  667  668  700  701  702  703  704  705  706  707  708  709  740  741  742
##   15    1    4  247   25  301  153  117  152   73   43   38  416   60   76  102
##  743  744  745  746  747  748  749  750  751  752  753  754  755  756  757  758
##   36   11   43   57   71   56  337   35   18   30   76   33   37    7   27   46
##  759  760  761  762  763  764  765  766  767  768  769  770  771  772  773  774
##   21   10   84   12   25   12   12   15   10   13   13   22   19   17   19   12
##  775  776  777  778  779  780  781  782  783  784  785  786  787  788  789  790
##   12   20   19   14   10  248  155   29   97   68   27    5  119   45   32   35
##  791  792  793  794  795  796  797  798  799  800  801  820  821  822  823  824
##   25    8   11    5   65   17   84    4   27   10   16  342   20  140   91   93
##  825  826  827  828  829  830  831  832  833  834  835  836  837  838  839  840
##   56   38   28   30   31   33   10    3   34   30   48    6    8   18    5    4
##  841  842  843  844  845  846  847  849  851  860  861  862  863  864  865  866
##   20   22   22   11    6    7    6    1    2  145  464  127   65  105   86   61
##  867  868  869  870  871  900  901  930  931  932  933  934  935  936  937  938
```

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##    4   17   36   10   11 1136   33   73  373  350   81   26   28   55   65   51
##  939  940  941  942  943  944 1100 1101 1102 1103 1104 1106 1107 1140 1141 1142
##   29    1   36    1    3   22  667  275   58  125   58    1    8  344   65  163
## 1143 1144 1145 1146 1147 1148 1149 1150 1151 1152 1153 1154 1155 1156 1157 1159
##   58   89   48   41   31   48   25   59    7   15   18   16   10    9   75    4
## 1160 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234
##   12  130   10   72   10   13    9   12   12    5   39   49    7    2   11   50
## 1235 1236 1237 1238 1239 1240 1241 1242 1243 1244 1245 1246 1247 1248 1249 1250
##    4    8   20   11   46    4    5   22   15   24   13   11   24   13    8   23
## 1251 1252 1253 1254 1255 1256 1257 1259 1260 1261 1262 1263 1264 1265 1266 1267
##    5   21    5   26    6    3    9    7   16   22    4   85   44    3   13  258
## 1268 1269 1270 1271 1272 1273 1274 1275 1276 1277 1278 1279 1280 1281 1282 1283
##   47   35   55    8   36   37   26   17   14  153  146   46   10   10   13   13
## 1300 1301 1302 1303 1304 1305 1306 1500 1501 1502 1503 1504 1540 1541 1543 1580
##   10  330   17   79   65  384  266  248  231  670   23   14 1177    6    2  566
## 1581 1582 1620 1621 1660 1661 1662 1700 1701 1702 1703 1704 1705 1706 1707 1708
##    5  613 1181   10   11   10    9  366  186   52    2  177   52   43   19   11
## 1709 1710 1711 1712 1713 1714 1715 1716 1740 1741 1742 1743 1744 1745 1746 1747
##   29   49   18   30   27   10   53   22  262  167  149  427   22   71   26   15
## 2220 2221 2223 2224 2226 2227 2228 2231 2740 2741 2742 2743 2744 9995 9998 9999
##   13    3   17   10   12   10   13   11   17   14   28   31   12 1957    6   58
```

```
##
##   -1    0    1    2    3    4    5    6    7    8    9   10   11
##   60 2007 7791 7892  227   18  933  650  700  605  373   25   12
##   12   13   14   15   16   17   18   19   20   21   22   23   24
## 1380 1927  294  308  814   17 13577  398   92  305  586  109   16
##   25   26   27   28   29   30   31   32   33   34  100  101  181
##  532  572    7    5   39  117  259  314  842    7   43   12    4
##  220  260  460  500  540  541  620  660  700  740  742  743  744
##   11   29   10   24   44   27   11    6   37    1   10   27   27
##  745  821  822  823  824  860  931 1100 1220 1620 1621 1622 1660
##   17   14   66   14   20  147    1   10   17    9   15   15   32
## 1661 1662 1700 1701 1702 9995 9998 9999
##   40   10   17   11   19 1022  113   81
```

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##
##   -1    1  100  101  102  103  104  105  106  107  108  109  110  140  141  142
##   77   80  189   97   53  411   43   29   78  145   12   17   19  108   90  146
##  143  144  145  146  147  148  149  150  151  152  153  154  155  156  158  159
##   84    6   14   29   25  181   10   20   76   30   24   23   44    3   21   39
##  160  161  164  180  181  182  183  184  185  186  187  188  189  190  191  192
##   60    1   12  640   18   85   81   78   31   26    6   17   25   34   24   35
##  193  194  195  196  197  198  199  220  221  222  224  226  228  229  260  261
##    2    2    9    1    6   13   11  393  339    2    1    2    3    2 1224  345
##  262  263  265  267  268  269  270  271  272  273  274  275  276  277  278  300
##  208  115   27   15   11   44   21   39   34   17   14    9    9   20   54  295
##  301  302  303  304  305  306  307  308  309  310  311  312  340  341  342  343
##  182  220  187  158   96  112   46   60   10   84   16   31  229  141   89  228
##  344  345  346  347  348  349  350  351  352  353  354  355  380  381  382  383
##   95   24   45   11    9   23  189   19   21   12   21    9  188    3    2   32
##  384  385  386  387  388  389  390  391  392  393  394  395  420  421  422  423
##   98   54  111   52  259   43   59   79   19   99   12   71   24   59   21   12
##  424  425  426  427  428  429  430  431  432  433  434  435  436  437  438  460
```

```
##    9   45   58   24  169  170   12   15  343   78   20   10   75   19   11  141
##  461  462  463  464  465  466  467  468  470  471  500  501  502  503  504  505
##    9   11  419  156  113  208   71   39    2   14   20  373    6   29   29  108
##  506  507  508  509  510  511  512  513  514  515  516  517  518  540  541  542
##    1    2   15   78   14   69   11  149    1   60   96   63   30  711  102  233
##  543  544  545  546  547  548  549  550  551  552  553  555  557  558  560  580
##  330   22   63   33   46  157   39  158   94   17   13   34   49   54   19  593
##  581  582  583  584  585  586  587  588  589  590  591  592  593  594  620  621
##  119   42  122    6   40    5    2   73  103   11   13   25    8   15  381  272
##  622  623  624  625  626  627  628  629  630  631  632  633  634  635  636  637
##  328   25   21   53   12   35   35   26   19   35   23   19    8   19    2   25
##  640  641  642  643  644  645  646  647  648  649  660  661  662  663  664  665
##    9    3    1    7    9   15   15   10   12   20  501  315  175   86   18   53
##  666  667  668  701  702  703  704  705  706  707  708  709  710  711  712  713
##   14    3   10  123   34  308  152  125  162   74   44   42  413   17  162   52
##  740  741  742  743  744  745  746  747  748  749  750  751  752  753  754  755
##   64   95  102   40   14   50   60   75   60  347   44   23   31   95   46   42
##  756  757  758  759  760  761  762  763  764  765  766  767  768  769  770  771
##    8   28   52   25   12   11   31   22   14   14   21   13   13   22   20   11
##  772  773  774  775  776  777  778  779  780  781  782  783  784  785  786  787
##   20   23   10   12   18   35   29   24  234  153   33  105   73   28    4  120
##  788  789  790  791  792  793  794  795  796  797  798  799  800  801  820  821
##   42   31   37   28    9   11    6   66   17   84    4   30   10   17  330   11
##  822  823  824  825  826  827  828  829  830  831  832  833  834  835  836  837
##  144   90   93   58   39   29   33   30   33   10    3   34   30   49    6    7
##  838  839  840  841  842  843  844  845  846  847  849  851  852  860  861  862
##   22    5    8   20   20   24   11    6    7    6    1    2    1  138  427  135
##  863  864  865  866  867  868  869  870  900  901  902  903  904  905  906  907
##   72  123   88   59    3   19   39   15  389   16   11  479  173   17   48   13
##  930  931  932  933  934  935  936  937  938  939  940  941  942  943  944 1100
##   19   58   26   65    1   51   80   27   37  376   34   38  351    2    6  680
## 1101 1102 1103 1104 1106 1107 1140 1141 1142 1143 1144 1145 1146 1147 1148 1149
##  258   57  127   59    1    8  325   74  172   56   90   51   38   33   49   27
## 1150 1151 1152 1153 1154 1155 1156 1157 1159 1160 1220 1221 1222 1223 1224 1225
##   60    6   16   20   17   12    9   79    3   11  125  123    6   14   17    8
## 1226 1227 1228 1229 1230 1232 1234 1235 1236 1237 1238 1239 1240 1241 1242 1243
##   46   22    3    7   16    1   12   46    3    2    4   15   19    2    5   16
## 1244 1245 1246 1247 1249 1250 1251 1252 1253 1254 1255 1256 1257 1258 1259 1260
##   25    2   11    1   27    6    7    8   25    6    3   14   29   23    3  446
## 1261 1262 1263 1264 1300 1301 1302 1303 1304 1305 1306 1500 1501 1502 1503 1504
##  155  324   68  124  334   85   68  387  259   25   11  634   51  120  140   50
## 1505 1620 1621 1660 1661 1662 1663 1664 1665 1666 1667 1668 1669 1700 1701 1702
##   12    2    5   55  363    4   34   23   22    9    5   21    1  374  192   52
## 1703 1704 1705 1706 1707 1708 1709 1710 1711 1712 1713 1714 1715 1716 1740 1741
##    2  160   51   41   19   12   28   49   16   29   25   18   52   22  418   10
## 1742 1743 1744 1745 1746 1747 1748 1749 1750 2221 2222 2223 2224 2225 2226 2227
##  270  158  158    5   78   30   22   12    7   67    3    8   10    8   13   14
## 2228 2229 2230 2740 2741 2742 2743 2744 2745 2746 9990 9995 9996 9998 9999
##   12   18   13   50   29  106   23   19   52   63 2713 1906 2399   65  215

##
##   -1    0    1    2    3    4    5    6    7    8    9   98   99
##   63 6896 2042 6984 5926 9431 7462 2380 1755 2228  440  113  103
```

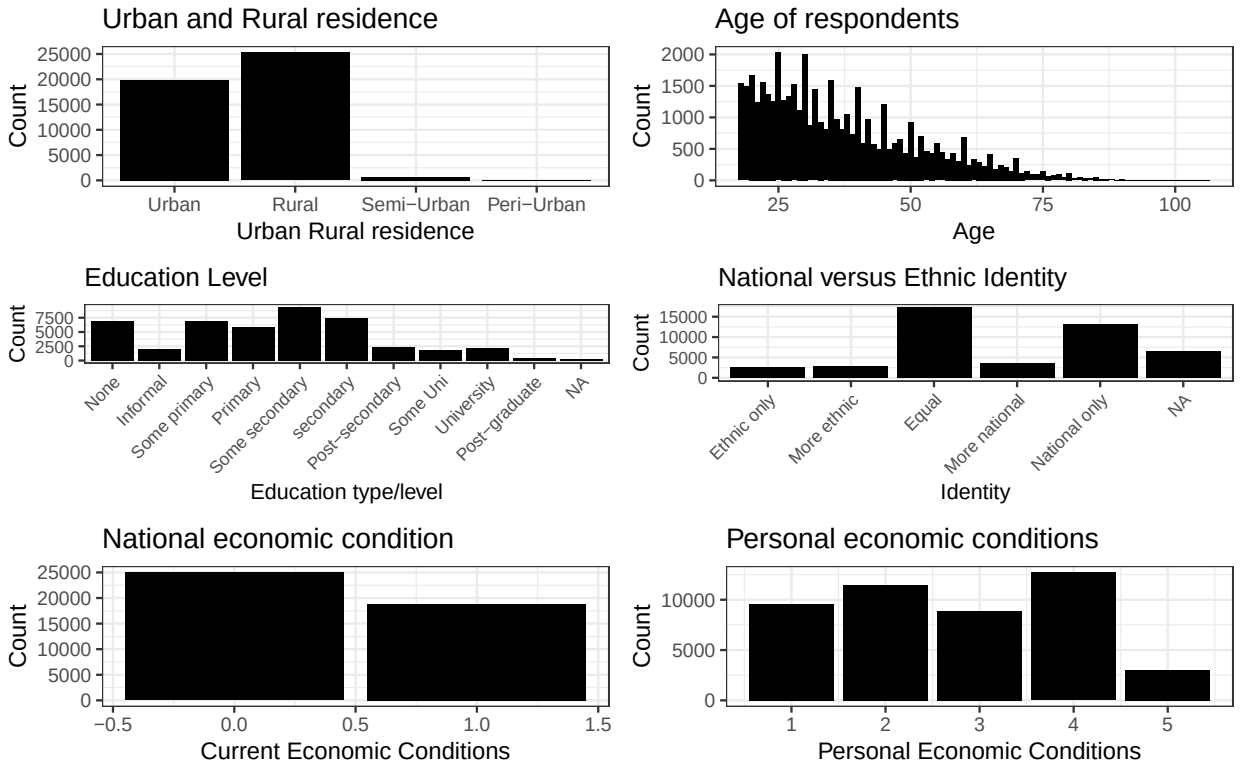
```
##
##    -1   100   101   102   103   104   105   106   140   141   142   143   144
##    68   141    15    16    23    93    25     4    66   351    25    35     1
##   146   180   181   182   184   185   187   188   189   190   191   192   193
##   177     6    41     1   227     1     1     8    13     1     1     5    37
##   220   221   226   227   260   261   262   263   264   265   267   300   301
##   254   148    21     2     8   421   873     2    17     1     1     1     4
##   302   303   304   305   306   307   308   309   340   341   342   343   344
##   310     1     1    29     3    19    43   476   149   364    35    50     4
##   345   346   348   349   352   353   354   382   383   384   386   387   389
##     1     3     2     6    43    16     6     2     1    31   153     2   320
##   393   394   395   400   408   409   410   422   424   425   428   429   432
##     2     1     3     1     3     5    28     1    15     1     5     2     1
##   433   434   435   437   438   440   441   443   461   462   463   464   467
##     1     2     1    35   122    32    74     3   326     1   224     1    54
##   471   474   500   501   502   503   505   506   507   508   509   510   511
##    98     1   109     6    16     4     7    23     1     3    10     6     1
##   512   513   514   515   516   517   540   541   542   543   580   582   583
##   156    19    16     8    91    20   825   181    56     1    16     1     1
##   584   585   587   588   589   590   591   592   593   594   620   621   622
##    57     1     2    15    13     1     5   559     7     2     1   410     1
##   623   624   625   626   628   631   634   638   639   640   642   643   660
##     1     4    15     1     4     1     5   306     1     1     1     1    88
##   661   662   663   664   665   669   671   672   674   677   678   679   684
##    13     9   350     7     1     4     3     6     2     1     5    26     1
##   685   686   700   702   704   705   708   711   712   716   726   740   741
##     7    18     8   519     1    91    14     1     5   103     3  1218    91
##   742   744   746   758   780   781   782   784   788   790   791   821   823
##   259     6     1     5   568   144    31    24     1     4     1     9     4
##   825   826   827   828   860   861   862   863   864   866   867   900   901
##     4   371     5   219   147   414     1     1     3     1    26    48     2
##   902   903   904   906   908   909   930   931   932   933   936   937  1100
##     8    20    15     1    32     5   520   245     6     1    21    45     8
##  1101  1102  1103  1104  1105  1106  1107  1108  1109  1110  1111  1140  1141
##    20    74   132   376     5     7     4     2    18    17    14   131     6
##  1142  1143  1144  1145  1148  1149  1150  1151  1220  1221  1222  1223  1224
##    43    12     2     1     5     1     2    23   350    38    22     8    11
##  1260  1261  1262  1263  1265  1266  1268  1269  1300  1301  1302  1303  1304
##   169   143   125     5     1     1     2    23   363   230    32    15     6
##  1305  1306  1307  1308  1500  1501  1502  1503  1504  1505  1506  1507  1508
##     4     2     1    14    58    20    16    12     8     8     4     4     2
##  1540  1541  1542  1543  1544  1545  1546  1580  1581  1582  1583  1584  1585
##   123    29    32    21    18    14    19    50    64     1    16     3     3
##  1586  1587  1588  1589  1660  1661  1662  1663  1664  1700  1701  1702  1703
##     1     4     7     4   267   132    23     9     5   177    70    15     4
##  1704  1740  1741  1742  1743  1744  1745  1746  1747  1748  9995  9996  9997
##     4   123   109    12    29     4     1     1    14   328   346  1200 23747
##  9998  9999
##  1021   120
```

```
##
##   -1  100  101  102  103  104  105  106  107  140  141  142  143  144  145  146
##   65  492   46   20   36  258   61   17   27   71  499   30   35    1    2  266
##  180  181  182  183  184  185  186  187  188  189  192  193  220  221  224  225
```

```
##    8   76    3    2  521    9    3    2   20   18   11   94  351  205    2    1
##  226  227  260  261  262  263  264  267  268  301  302  303  304  305  306  307
##   66    7   16  509 1177    5   33    3    2    3  385    2    1   38    5   14
##  308  309  340  341  342  343  344  345  346  347  348  349  352  353  354  380
##   33  701  186  452   38   55    3    1    1    1    4    4   59   23    7    1
##  382  383  384  386  387  389  393  395  398  399  401  408  409  410  422  424
##    2    1   46  258    4  556    2    2    2    1    1    3    3   47    1   17
##  425  428  429  433  437  438  440  441  443  461  462  463  465  467  468  469
##    4    6    6    1   57  187   47   86    5  350    1  355    1   79    3    1
##  470  471  474  500  501  502  503  504  505  506  507  508  509  510  511  512
##    1  130    2  146    7   16    3    1   16   28    4    5   15    9    2  291
##  513  514  515  516  517  540  541  542  580  582  583  584  585  586  587  588
##   34   12   10  130   35 1089  274   66   25    3    2   77    1    1    3   20
##  589  590  591  592  593  594  620  621  622  623  624  625  626  628  630  633
##   17    3    5  788    6    3    2  628    4    2    2   20    3   11    1    1
##  634  637  638  640  643  660  661  662  663  664  665  669  670  671  672  674
##    6    2  454    1    3   72    9    5  358    7    1    4    1    3    6    2
##  677  678  679  684  685  686  700  702  704  705  706  707  708  709  711  712
##    1    7   17    1    7   22   14  853    1  220    1    1   20    1    1    2
##  713  714  716  721  726  728  740  741  742  744  754  757  758  780  781  782
##    2    2  190    3    2    2 1496  112  357    3    1    1   10  637  208   40
##  784  788  790  791  821  823  825  826  827  828  830  831  832  860  861  862
##   23    1    4    1   23    6    3  540    9  292    1    2    1  189  458   10
##  863  864  866  867  900  901  902  903  904  905  906  907  908  909  910  911
##    4    4    2   43   97   10   27   79   38    4    5    9   53   10    1    3
##  930  931  932  933  935  936  937 1100 1101 1102 1103 1104 1105 1106 1107 1109
##  557  292    3    1    1   20   44   10   20  106  176  314    4    6    1   38
## 1110 1111 1140 1141 1142 1143 1144 1145 1146 1147 1148 1149 1150 1151 1220 1221
##   21   14  229    8   94   14    4    1    1    1    5    3    5   52  543   49
## 1222 1223 1224 1260 1261 1262 1263 1265 1266 1268 1269 1300 1301 1302 1303 1304
##   22    9   16  252  185  129    6    1    1    1   38  398  323   66   28    6
## 1305 1306 1307 1308 1500 1501 1502 1503 1504 1505 1506 1507 1508 1540 1541 1542
##    6    3    2   15   70   27   20   15    8   11    3    5    1  287   42   55
## 1543 1544 1545 1546 1580 1581 1582 1583 1584 1585 1586 1587 1588 1589 1660 1661
##   35   26   19   39   90   62    1   22    2    5    1    4   11    3  425  184
## 1662 1663 1664 1700 1701 1702 1703 1704 1740 1741 1742 1743 1744 1747 1748 9995
##   39    7    5  251  141   29    7    8  126  153    4   53    4    1  534 1221
## 9996 9997 9998 9999
## 1200 5093 4863 6170

##
##   -1    1    2    3    4    5    7    8    9   99
##  1001 2488 2871 17251 3546 13064 2993   42  168 2399

##
##   -1    1    2    8    9
##    2 25000 18899  114 1808

##
##   -1    1    2    3    4    5    8    9
##    5 9555 11496 8914 12712 3010   19  112
```

Now that we have the data cleaned and plots made, we can take a look at them. The step above takes a decent bit of time, particularly with new datasets and formats you are unfamiliar with. Finding a codebook

is useful, but keep in mind that codebooks for panel or temporal data may shift over time. Take note of reverse codings as well, where two questions next to each other may be coded in opposite directions as you suspect. Finally, codebooks and datasets have errors, use intuition at times when you are unsure, also ask other people that use them.



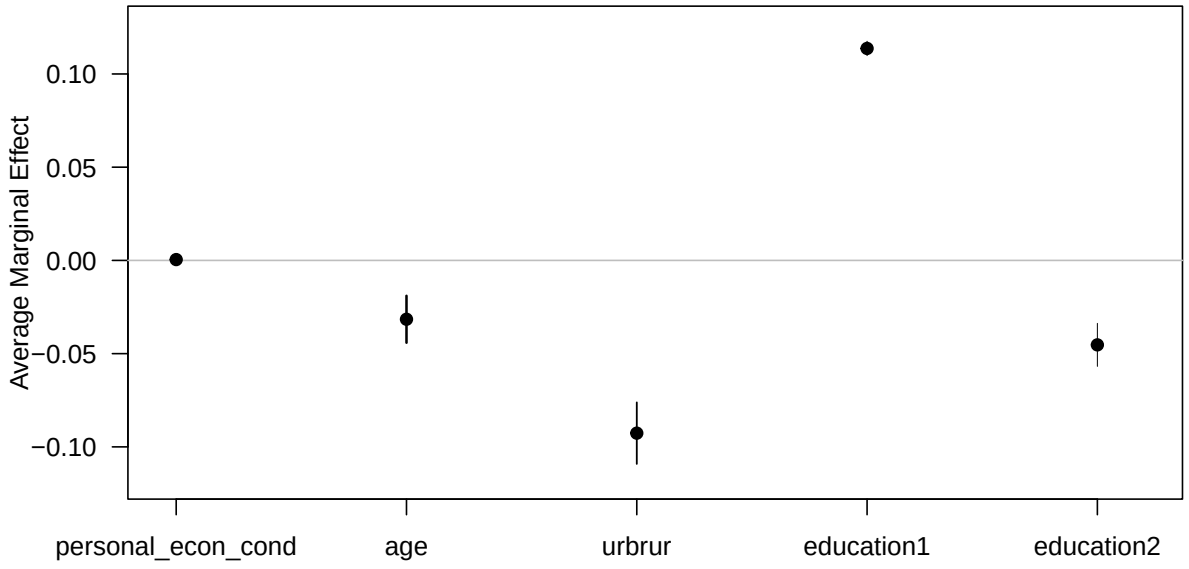
A few things stand out to check. First, Most respondents are urban or rural. One way to deal with this to make a binary would be to select either urban or rural, and make those values a 1 and make all otters a 0. This lets you keep the data if you operate under the assumption that whichever category is a 1 is distinct enough from the others to make a theoretical difference. If you cannot make that assumption, do not combine them. Moreover, age has some interesting trends that are likely non-random. We can explore that further later, but it seems like certain values are showing up at a much higher rate than they should. We would expect that people residing at home during the enumeration time may be systematically different in some way, and good survey companies will give you these data. AB records time of interview, number of times approached, and outlines their rigorous methodology for who is to be selected at each household. In this case, it is likely people reporting the nearest age ending in 0 or 5, though I have not checked. Education is clearly right-skewed and indicates most respondents have not completed the equivalent of high school. For national versus ethnic identity, this is actually a shift into neutrality and national identity that may be driven by social-desirability bias. In previous rounds, this question is strongly right-skewed. Lots of NAs in this question as well, another indication of cautious respondents. We can see in the bottom two figures that few respondents think that economic conditions are excellent for either themselves or their country. Let's say we want to test for the correlation of perceptions of current economic conditions on perceptions of naitonal economic conditions, which is one correlate of voting behvior in the US.

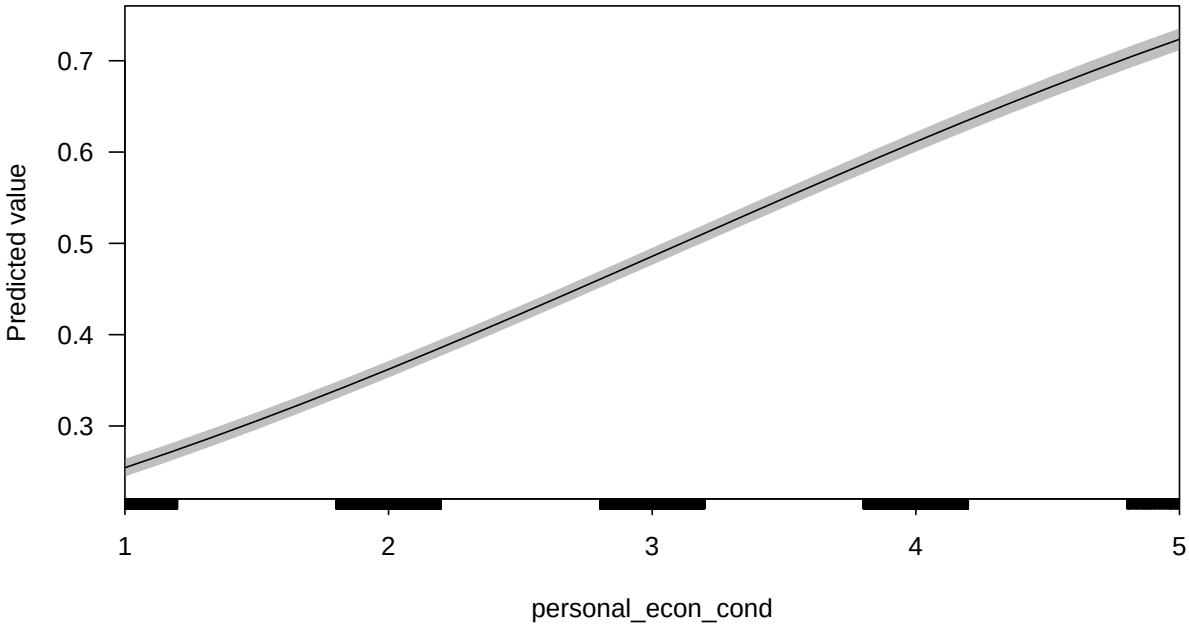
```
##  [1] "id"                  "country"             "urbrur"
##  [4] "region"              "age"                 "language"
##  [7] "religion"            "education"           "party_id"
## [10] "party_election_pref" "ethnic_id"           "nat_eth_id"
## [13] "current_direction"   "personal_econ_cond"
```

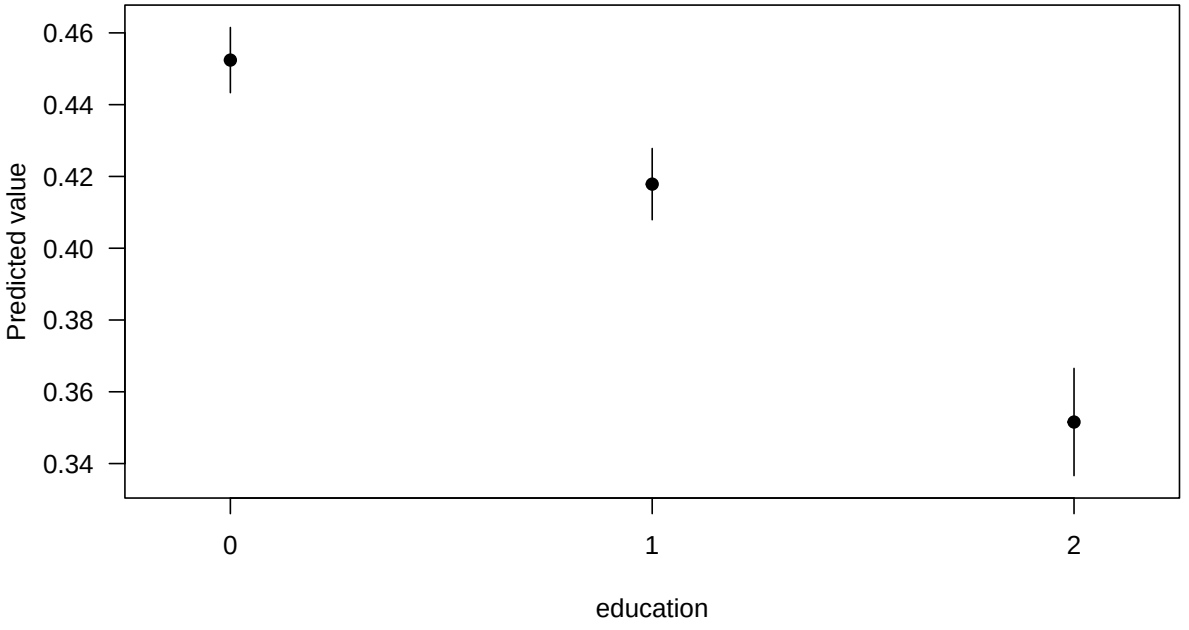
```
## GLM estimation, family = binomial(link = "logit"), Dep. Var.: current_direction
## Observations: 11,241
## Standard-errors: Standard
##                      Estimate Std. Error  t value Pr(>|t|))
## (Intercept)        -0.456294   1.084600 -0.42069  0.673982
## personal_econ_cond  0.497471   0.020402 24.38400 < 2.2e-16 ***
## ... 29 variables were removed because of collinearity (ethnic_id110, ethnic_id164 and 27 others [full
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Log-Likelihood: -5,873.2   Adj. Pseudo R2: 0.15252
##            BIC: 18,452.7     Squared Cor.: 0.295059
```

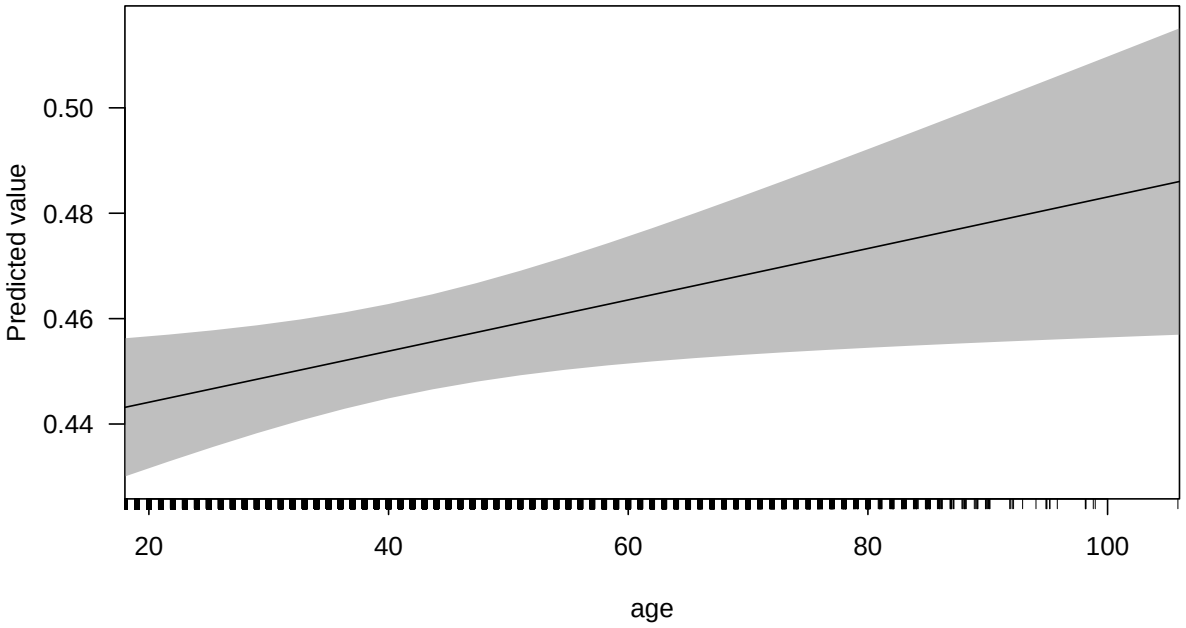
We see a large substantive effect that is statistically reliable. This is a logit remember, so the coefficient is not super useful by itself. Next steps would e something like marginal effects plots. I am doing a bit more data manipulation for time purposes and clarity. I am coarsening the levels of urban/rural as well as education and only including those two and age as controls. This will allow for a fairly clear marginal effects plot.

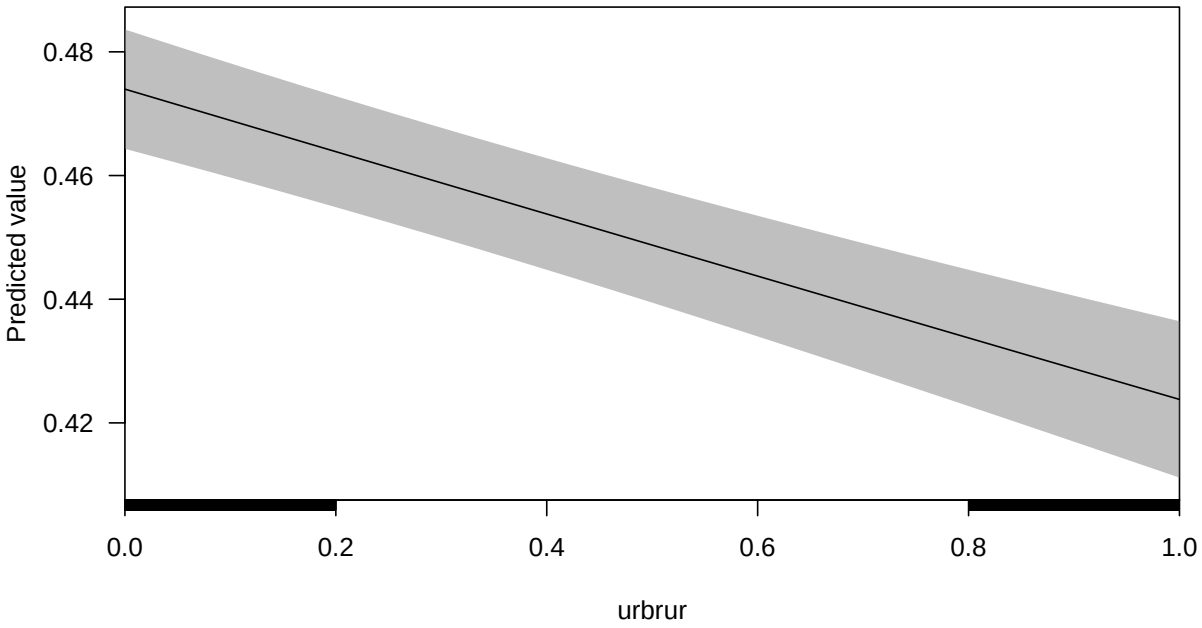
```
##              factor     AME     SE        z      p   lower   upper
##                 age  0.0004 0.0002   2.2587 0.0239  0.0001  0.0008
##          education1 -0.0316 0.0064  -4.9128 0.0000 -0.0442 -0.0190
##          education2 -0.0927 0.0084 -10.9986 0.0000 -0.1092 -0.0761
##  personal_econ_cond  0.1137 0.0020  58.2882 0.0000  0.1099  0.1175
##              urbrur -0.0453 0.0059  -7.6971 0.0000 -0.0568 -0.0338
```




Predicted value
0.7
0.6
0.5
0.4
0.3
1
2
3
4
5
personal_econ_cond


Predicted value
0.46
0.44
0.42
0.40
0.38
0.36
0.34
0
1
2
education


Predicted value
0.50
0.48
0.46
0.44
20
40
60
80
100
age


Predicted value
0.48
0.46
0.44
0.42
0.0
0.2
0.4
0.6
0.8
1.0
urbrur