DCM_assignment_03

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Task 01: Importing data and Data Preparation

Introduction. This data is about people's political affiliation considering other factors such as their education level, gender and their mindset towards immigrant. My assumption is people will higher education will have greater tie with liberal parties compared to less educated people. Additionally, I anticipate the attitudes towards immigrants will also have a significant impact on our analysis. Voters who think immigrants are making the United Kingdom a better place to live are inclined to turn towards liberal parties and the group who don't rate immigration as supportable issue will be are tend to vote for conservative parties more. Regarding gender, I expect it will not have a significant impact voting or political affiliation much.

```
# A tibble: 5 x 618
  name    essround edition proddate  idno cntry dweight pspwght pweight anweight
  <chr>      <dbl> <chr>   <chr>    <dbl> <chr>   <dbl>   <dbl>   <dbl>    <dbl>
1 ESS10e~       10 3.2     02.11.2~ 50002 GB      0.561   0.462    4.79     2.22
2 ESS10e~       10 3.2     02.11.2~ 50008 GB      1.12    0.852    4.79     4.09
3 ESS10e~       10 3.2     02.11.2~ 50021 GB      1.12    0.829    4.79     3.97
4 ESS10e~       10 3.2     02.11.2~ 50023 GB      1.12    1.82     4.79     8.73
5 ESS10e~       10 3.2     02.11.2~ 50033 GB      1.12    0.654    4.79     3.14
# i 608 more variables: prob <dbl>, stratum <dbl>, psu <dbl>, nwspol <dbl+lbl>,
#   netusoft <dbl+lbl>, netustm <dbl+lbl>, ppltrst <dbl+lbl>,
#   pplfair <dbl+lbl>, pplhlp <dbl+lbl>, polintr <dbl+lbl>, psppsgva <dbl+lbl>,
#   actrolga <dbl+lbl>, psppipla <dbl+lbl>, cptppola <dbl+lbl>,
#   trstprl <dbl+lbl>, trstlgl <dbl+lbl>, trstplc <dbl+lbl>, trstplt <dbl+lbl>,
#   trstprt <dbl+lbl>, trstep <dbl+lbl>, trstun <dbl+lbl>, trstsci <dbl+lbl>,
#   vote <dbl+lbl>, prtvtebe <dbl+lbl>, prtvtebg <dbl+lbl>, ...
```

Selecting necessary variables

Renaming variables and changing variables

converting all sorts of missing values into NA

```
 [1] "prtvtdgb"          "gndr"              "agea"
 [4] "edulvlb"           "imwbcnt"           "vote"
 [7] "party"             "gender"            "education"
[10] "immigrants_better" "age"               "voted"
```

```
# A tibble: 6 x 6
  party        gender education immigrants_better   age voted
  <fct>        <fct>      <int>              <int> <int> <dbl+lbl>
1 Labour       Male         800                  7    72 1 [Yes]
2 Conservative Female       520                  3    83 1 [Yes]
3 Conservative Male         113                  6    69 1 [Yes]
4 <NA>         Female       313                 10    21 2 [No]
5 <NA>         Female       212                  4    64 1 [Yes]
6 <NA>         Female       113                  5    70 2 [No]
```

```
            party            gender         education immigrants_better
              320                 0                21                 8
              age             voted
                7                 2
```

Dropping all missing observations

```
[1] 809
```

Task 02: Changing Party Variable names

Changing the party names

```
# A tibble: 13 x 3
   party_bloc   party                          n
   <fct>        <fct>                      <int>
 1 labour       Labour                       269
 2 conservative Conservative                 357
 3 liberal      Liberal Democrat              86
 4 other        Scottish National Party       38
 5 other        Plaid Cymru                    4
```

Table 1: ESS Election 2014: Descriptive statistics

education_fac			Mean	SD	Median	All	Percent
Less Educated (0)		age	62.05	15.92	65.00	410.00	100.00
	Political Affiliation	labour				116.00	28.29
		conservative				222.00	54.15
		liberal				32.00	7.80
		other				40.00	9.76
	gender	Male				197.00	48.05
		Female				213.00	51.95
Highly Educated (1)		age	54.52	16.79	54.00	399.00	100.00
	Political Affiliation	labour				153.00	38.35
		conservative				135.00	33.83
		liberal				54.00	13.53
		other				57.00	14.29
	gender	Male				174.00	43.61
		Female				225.00	56.39

Comments: Election in Great Britain 2014.

```
 6 other        Green Party                      38
 7 other        UK Independence Party             2
 8 other        Brexit Party                      3
 9 other        Other                             3
10 other        Ulster Unionist Party (nir)       4
11 other        Democratic Unionist Party (nir)   2
12 other        Sinn Féin (nir)                   2
13 other        Independent candidate             1
```

Task 03: Descriptive Statistics

```
[1] "party"             "gender"            "education"
[4] "immigrants_better" "age"               "voted"
[7] "party_bloc"        "high_edu"          "high_education"
```

Logic behind the selection: I chose people with intermediate level to doctoral degree as highly educated (1) and the rest as less educated (0).

In this dataset, the mean age for individuals with less education is 62.05 years, whereas for those with higher education, it is 54.62 years. Notably, individuals with lower education levels

showed a stronger turn towards the Conservative party, with 54.15% of them casting their votes in favor of this party. Conversely, individuals with higher education levels exhibited a higher preference for the Labour party, with 38.35% voting in its favor compared to the Conservative party. Additionally, the Liberal party earned a larger share of votes (13.53%) from the highly educated group compared to the less educated group (7.80%).

Task 04 Model Formation

Task 05 Model Estimation

```
# weights:  20 (12 variable)
initial  value 1121.512138
iter  10 value 949.425446
final  value 939.065829
converged

# weights:  24 (15 variable)
initial  value 1121.512138
iter  10 value 933.542486
iter  20 value 896.696375
final  value 896.690446
converged

Call:
multinom(formula = party_bloc ~ gender + age + high_education_f,
    data = df_ref_adj)

Coefficients:
             (Intercept) genderFemale        age high_education_f1
conservative   -1.692196 -0.054602649 0.03907751        -0.5173042
liberal        -3.162234 -0.190053549 0.03291439         0.4703555
other          -2.426137  0.006971024 0.02313492         0.2319489

Std. Errors:
             (Intercept) genderFemale         age high_education_f1
conservative   0.3491187    0.1709700 0.005376981         0.1735619
liberal        0.5416664    0.2517667 0.007914876         0.2631732
other          0.4936418    0.2405065 0.007391731         0.2474348

Residual Deviance: 1878.132
AIC: 1902.132
```

```
Call:
multinom(formula = party_bloc ~ gender + age + high_education_f +
    immigrants_better, data = df_ref_adj)

Coefficients:
             (Intercept) genderFemale        age high_education_f1
conservative   0.5051894 -0.089166476 0.03471436        -0.1671327
liberal       -3.1695944 -0.209343132 0.03307735         0.5001618
other         -2.4289983 -0.004305531 0.02310601         0.2490429
             immigrants_better
conservative     -0.3272981035
liberal          -0.0013221568
other             0.0001023664

Std. Errors:
             (Intercept) genderFemale         age high_education_f1
conservative   0.4623464    0.1785681 0.005602880         0.1858443
liberal        0.7362650    0.2523223 0.007984525         0.2700570
other          0.6784978    0.2409539 0.007438542         0.2548632
             immigrants_better
conservative        0.04403752
liberal             0.06549635
other               0.06201152

Residual Deviance: 1793.381
AIC: 1823.381
```

Table Containing estimates for both model, including confidence interval and odd ratios

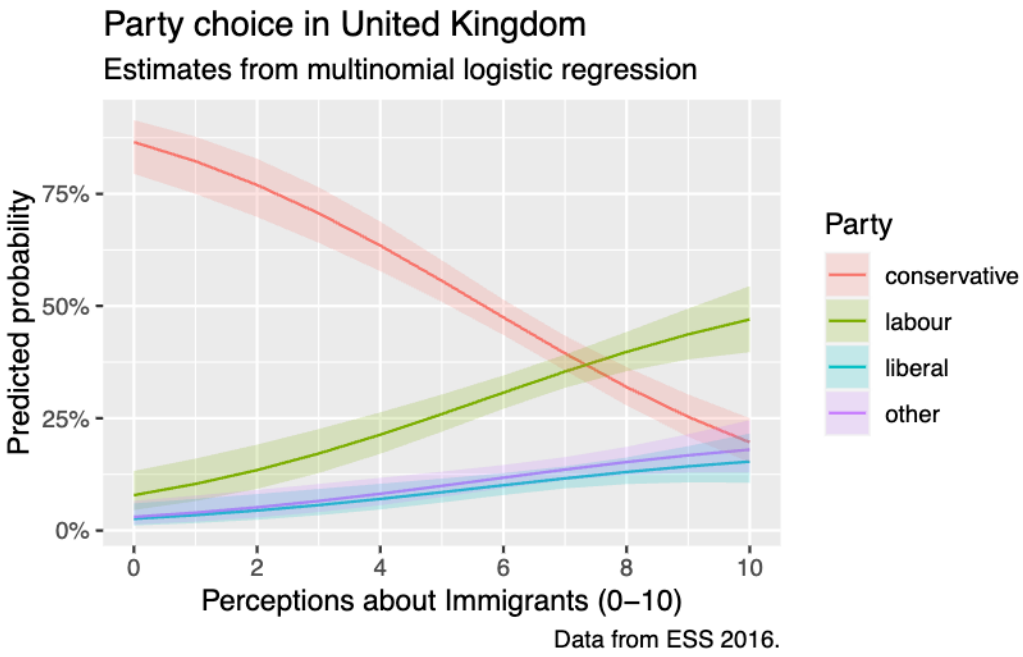
```
    Model      AIC      BIC
1 Model 1 1902.132 1958.481
2 Model 2 1823.381 1893.818
```

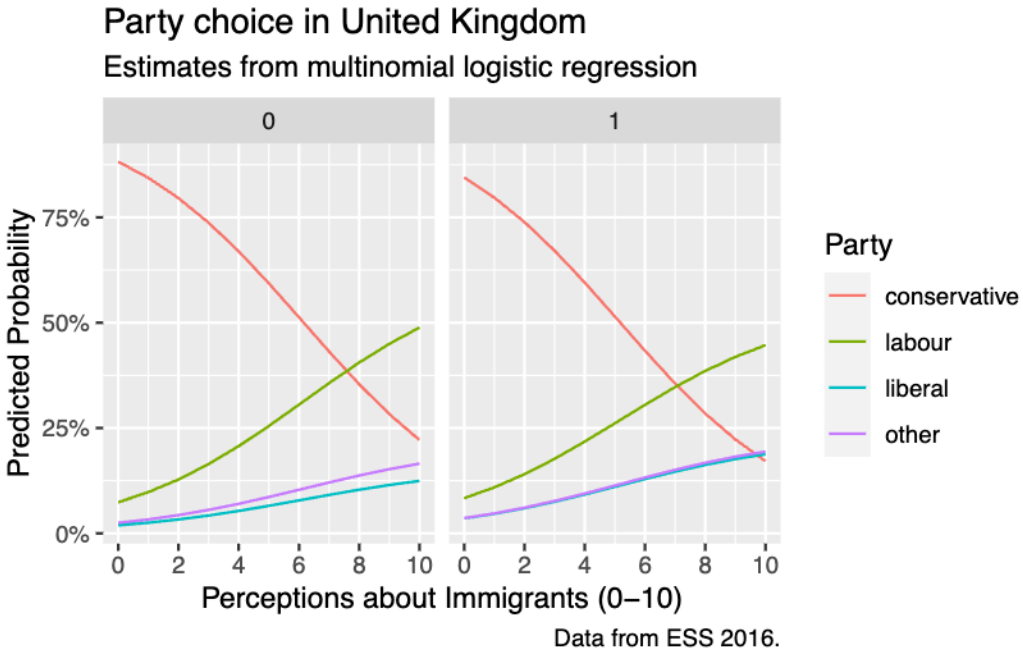
```
# A tibble: 64 x 4
   gender   age high_education_f immigrants_better
   <chr>  <dbl> <fct>                        <dbl>
 1 Male      20 0                                1
 2 Male      20 0                                4
 3 Male      20 0                                7
 4 Male      20 0                               10
 5 Male      20 1                                1
 6 Male      20 1                                4
```

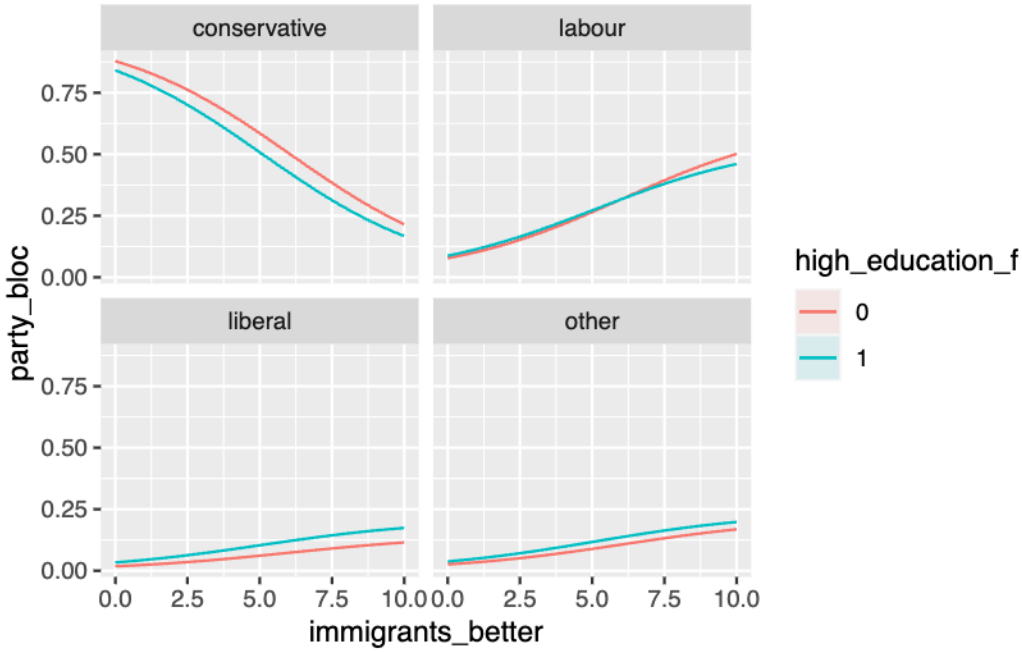
	A			B		
	conservative	liberal	other	conservative	liberal	other
(Intercept)	0.18	0.04	0.09	1.66	0.04	0.09
	[0.09, 0.36]	[0.01, 0.12]	[0.03, 0.23]	[0.67, 4.10]	[0.01, 0.18]	[0.02, 0.33]
genderFemale	0.95	0.83	1.01	0.91	0.81	1.00
	[0.68, 1.32]	[0.50, 1.35]	[0.63, 1.61]	[0.64, 1.30]	[0.49, 1.33]	[0.62, 1.60]
age	1.04	1.03	1.02	1.04	1.03	1.02
	[1.03, 1.05]	[1.02, 1.05]	[1.01, 1.04]	[1.02, 1.05]	[1.02, 1.05]	[1.01, 1.04]
high_education_f1	0.60	1.60	1.26	0.85	1.65	1.28
	[0.42, 0.84]	[0.96, 2.68]	[0.78, 2.05]	[0.59, 1.22]	[0.97, 2.80]	[0.78, 2.11]
immigrants_better				0.72	1.00	1.00
				[0.66, 0.79]	[0.88, 1.14]	[0.89, 1.13]
Num.Obs.	809			809		
R2	0.048			0.091		
R2 Adj.	0.047			0.090		
AIC	1902.1			1823.4		
BIC	1958.5			1893.8		
RMSE	0.40			0.39		

```
 7 Male      20 1                          7
 8 Male      20 1                         10
 9 Male      40 0                          1
10 Male      40 0                          4
# i 54 more rows
```

```
# A tibble: 5 x 33
  immigrants_better prob.labour prob.conservative prob.liberal prob.other
              <dbl>       <dbl>             <dbl>        <dbl>      <dbl>
1                 0      0.0786             0.865       0.0260     0.0301
2                 2      0.134              0.770       0.0443     0.0515
3                 5      0.259              0.556       0.0852     0.0993
4                 8      0.398              0.320       0.130      0.152
5                10      0.470              0.196       0.153      0.180
# i 28 more variables: logit.labour <dbl>, logit.conservative <dbl>,
#   logit.liberal <dbl>, logit.other <dbl>, se.prob.labour <dbl>,
#   se.prob.conservative <dbl>, se.prob.liberal <dbl>, se.prob.other <dbl>,
#   se.logit.labour <dbl>, se.logit.conservative <dbl>, se.logit.liberal <dbl>,
#   se.logit.other <dbl>, L.prob.labour <dbl>, L.prob.conservative <dbl>,
#   L.prob.liberal <dbl>, L.prob.other <dbl>, U.prob.labour <dbl>,
#   U.prob.conservative <dbl>, U.prob.liberal <dbl>, U.prob.other <dbl>, ...
```


Party choice in United Kingdom
Estimates from multinomial logistic regression
Predicted probability
75%
50%
25%
0%
0
2
4
6
8
10
Perceptions about Immigrants (0–10)
Data from ESS 2016.
Party
conservative
labour
liberal
other


Party choice in United Kingdom
Estimates from multinomial logistic regression
0
1
Predicted Probability
75%
50%
25%
0%
0
2
4
6
8
10
Perceptions about Immigrants (0–10)
Data from ESS 2016.
Party
conservative
labour
liberal
other



Model Explanation

Second Model (mdl_b)

The coefficient for immigrants_better (-0.327 for Conservative) indicates the change in log-odds associated with perception about immigrants to the country.

A negative coefficient indicates that thinking "immigrants are making the UK better place to live" reduces the likelihood of choosing the respective party bloc which is Conservative. It is shown in the figure too. The probability of choosing conservative party decrease sharply as the rating for immigrants goes higher.

We have a positive coefficient (0.500 for Liberal) regarding the education variable implies that highly educated individuals are more likely to choose the Liberal Party compared to less educated individuals. The coefficients for conservative party is negative. So, highly educated people are less likely to vote for conservative party compare to less educated people.

Immigrants_better variable has negative relationship with party liberal and conservative party blocs and very slightly positive relationship with other political parties.

Standard errors measure the variability of the coefficients. Lower standard errors indicate more precise estimates. For the 'age' and 'immigrants_better' variables the model has lower standard errors but for the some other variables it has higher values.

Model Fit

Both AIC and BIC value of model 2 (mdl_b, second model) are lower than the model 1, indicating second model is the better fit than first model.

Probability:

From the figures, it's evident that as the value of 'immigrants_better' increases, the probability of individuals belonging to the Labour, Liberal, and Other parties also increases. However, the increase in probability is more pronounced for the Labour party compared to the other two parties, regardless of individuals' education levels. Conversely, for the Conservative party, the probability decreases dramatically as the value of 'immigrants_better' increases, irrespective of individuals' education levels.

Conclusion:

I assumed that people with higher education tend to vote more for liberal parties than conservatives. That aligns with the result. Society's perception is a key factor, I expected it would impact the outcome more but got a moderate result. It has an impact on voting but not as much as I expected. I got negative coefficients for gender for all four parties. This means all else being equal, being female tends to decrease the log odds or the likelihood of belonging to the respective parties (Conservative, Liberal, and Other) compared to being male. In other words, females are less likely to belong to these parties compared to males. So, the impact is not clear to me.