Emotion Analysis

Analysis performed using Italian_LIWC2007 Dictionary

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5/2022

Contents

Emotion analysis

Import the LIWC2007_Dictionary

```
# Data
load("data/dfm.Rda")

# Dictionary LWIC Complete
LWIC_ITA <- dictionary(file = "data/large_files/Italian_LIWC2007_Dictionary.dic",
                       format = "LIWC")
```

```
## note: removing empty key: Formale

## note: removing empty key: Passivo
```

```
emotions <- c("Emo_Pos", "Emo_Neg", "Ansia", "Rabbia", "Tristezza", "Ottimismo" )

# Count the number of words
n.words <- c(
length(LWIC_ITA[["Emo_Pos"]]),
length(LWIC_ITA[["Emo_Neg"]]),
length(LWIC_ITA[["Ansia"]]),
```

```
length(LWIC_ITA[["Rabbia"]]),
length(LWIC_ITA[["Tristez"]]),
length(LWIC_ITA[["Ottimis"]])
)

num_words <-  data.frame(emotions,n.words)

# Extracting only the keys we need
myLWIC_ITA <- dictionary(list(positive = LWIC_ITA[["Emo_Pos"]],
                              negative = LWIC_ITA[["Emo_Neg"]],
                              anxiety = LWIC_ITA[["Ansia"]],
                              anger = LWIC_ITA[["Rabbia"]],
                              sadness = LWIC_ITA[["Tristez"]],
                              optimism = LWIC_ITA[["Ottimis"]]
                              ))

myLWIC_ITA_sent <- dictionary(list(positive = LWIC_ITA[["Emo_Pos"]],
                              negative = LWIC_ITA[["Emo_Neg"]]))
```

```
kable(num_words)
```

emotions	n.words
Emo_Pos	200
Emo_Neg	663
Ansia	65
Rabbia	227
Tristezza	226
Ottimismo	93

Group and weight the dfm

```
# By party & quarter
dfm_weigh_p_quart <- dfm_group(DFM, groups = interaction(party_id, quarter))%>%
  dfm_weight(scheme = "prop")
```

Apply the dictionary

```
# Apply Dictionary to DFM
DFM_emotions <- dfm_lookup(dfm_weigh_p_quart,
                           dictionary = myLWIC_ITA)
DFM_emotions
```

```
## Document-feature matrix of: 110 documents, 6 features (0.76% sparse) and 3 docvars.
##                 features
## docs               positive   negative     anxiety       anger     sadness
##   CI.1          0.008060854 0.02236603 0.003405995 0.006471390 0.004541326
##   FDI.1         0.006416312 0.02893245 0.002834199 0.011061250 0.006140765
##   FI.1          0.006498830 0.02547256 0.003243474 0.007675035 0.006974064
```

```
##   INDIPENDENTE.1 0.005129667 0.01567398 0.001994870 0.005984611 0.003989741
##   IV.1           0.008545455 0.02309091 0.003272727 0.009272727 0.006000000
##   LEGA.1         0.006352373 0.02593448 0.003005565 0.008426081 0.006194876
##                 features
## docs               optimism
##   CI.1           0.01089918
##   FDI.1          0.01487955
##   FI.1           0.01447089
##   INDIPENDENTE.1 0.01025933
##   IV.1           0.01600000
##   LEGA.1         0.01257350
## [ reached max_ndoc ... 104 more documents ]
```

Transform the DFM into an ordinary dataframe

```
data_dict_emo <- DFM_emotions %>%
  quanteda::convert(to = "data.frame") %>%
  cbind(docvars(DFM_emotions))

# Create a new variable with the difference of negative - positive emotions
data_dict_emo$negative_prevalence <-
  (data_dict_emo$negative - data_dict_emo$positive)

# Transform the proportion into percentage
data_dict_emo <- data_dict_emo %>%
  mutate(positive =  positive * 100,
                    negative = negative * 100,
                    anxiety = anxiety * 100,
                    anger = anger *100,
                    sadness = sadness * 100,
                    optimism = optimism *100,
                    negative_prevalence = negative_prevalence *100)
```

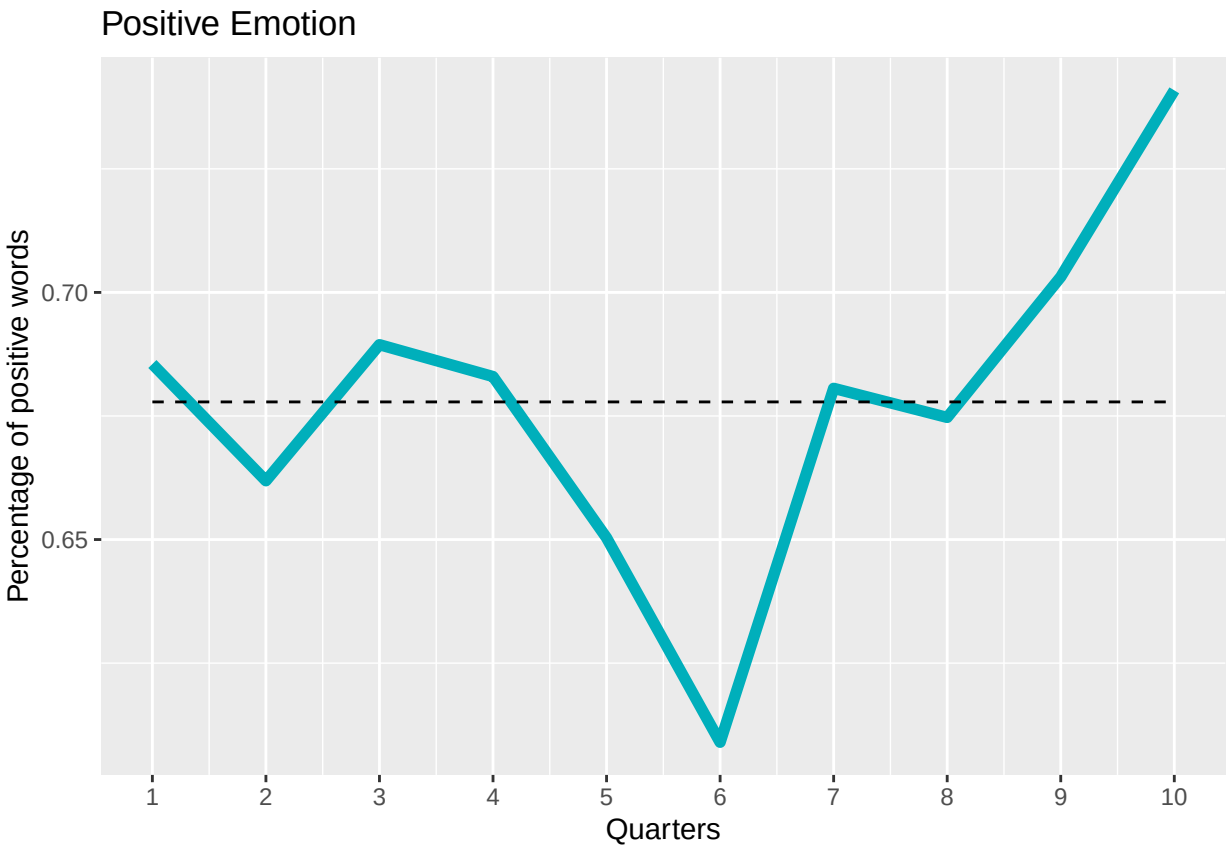
Percentage of the emotions in time

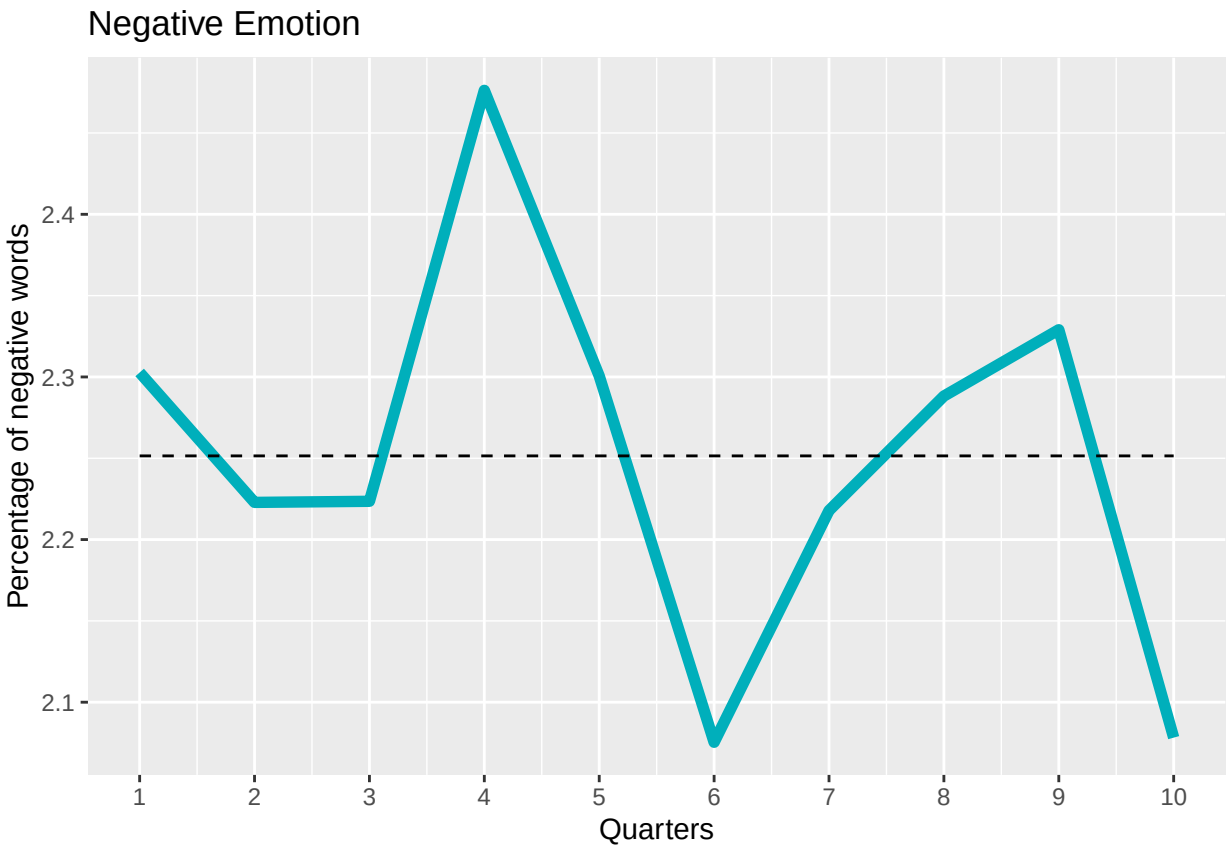
These are the start and end dates of the quarters covered by the analysis

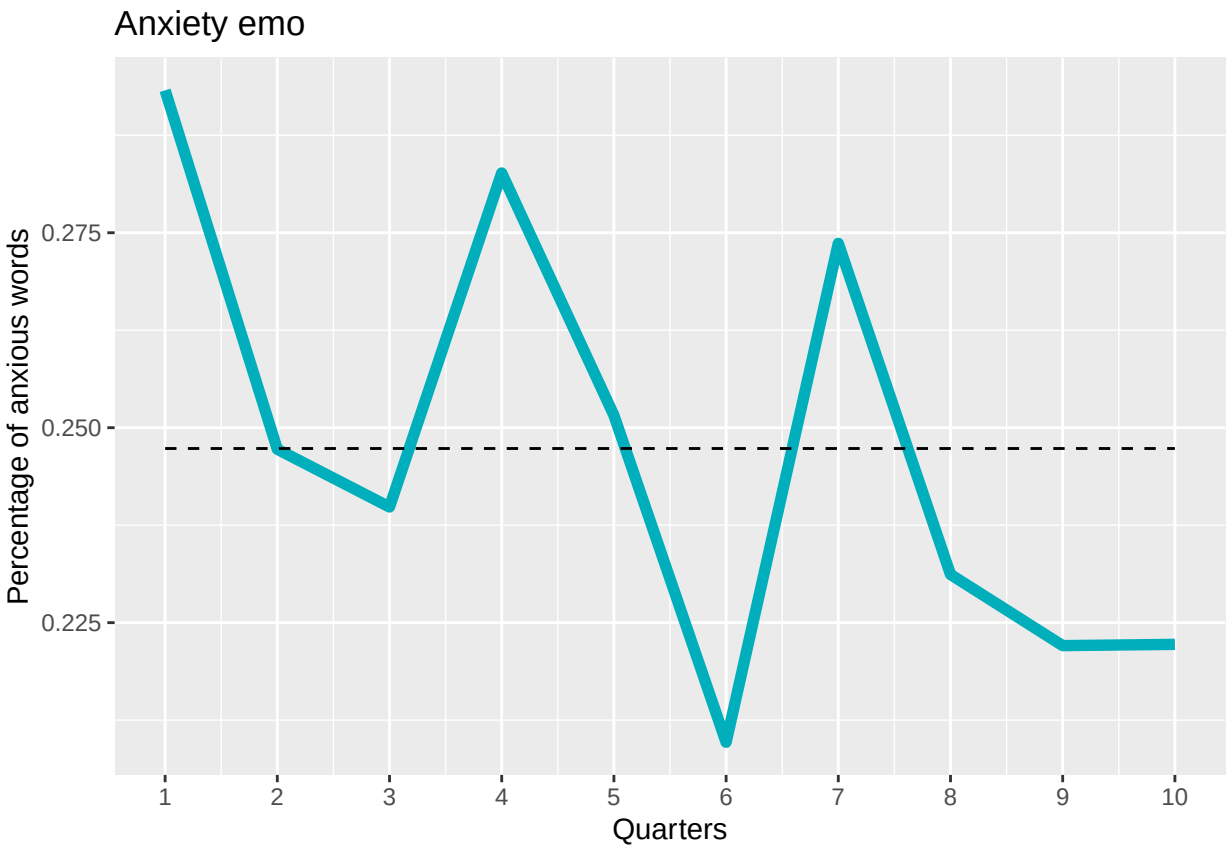
Trimester	from	to
1	01 January 2020	31 March 2020
2	01 April 2020	30 June 2020
3	01 July 2020	30 September 2020
4	01 October 2020	31 December 2020
5	01 January 2021	31 March 2021
6	01 April 2021	30 June 2021
7	01 July 2021	30 September 2021
8	01 October 2021	31 December 2021
9	01 January 2022	31 March 2022
10	01 April 2022	18 April 2022

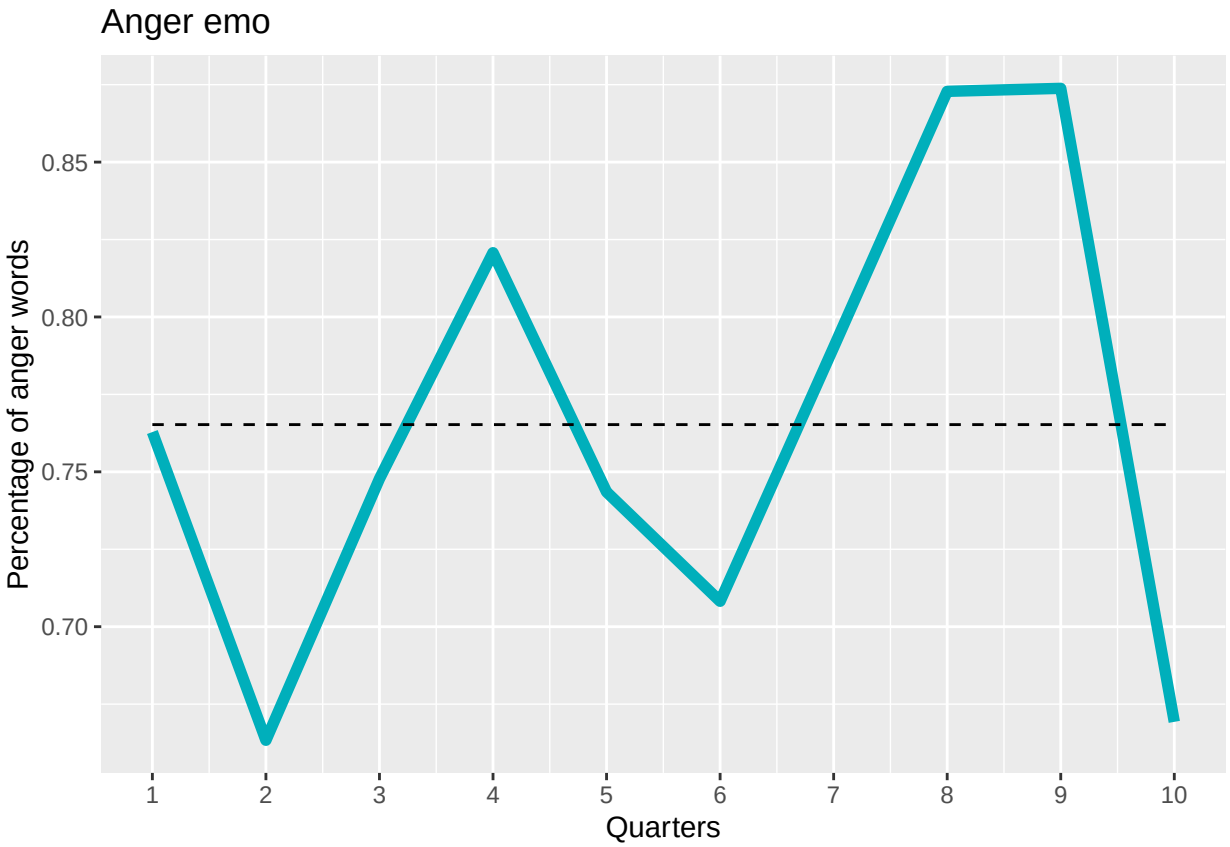
The code is only shown for 'positive' but is identical for all emotions

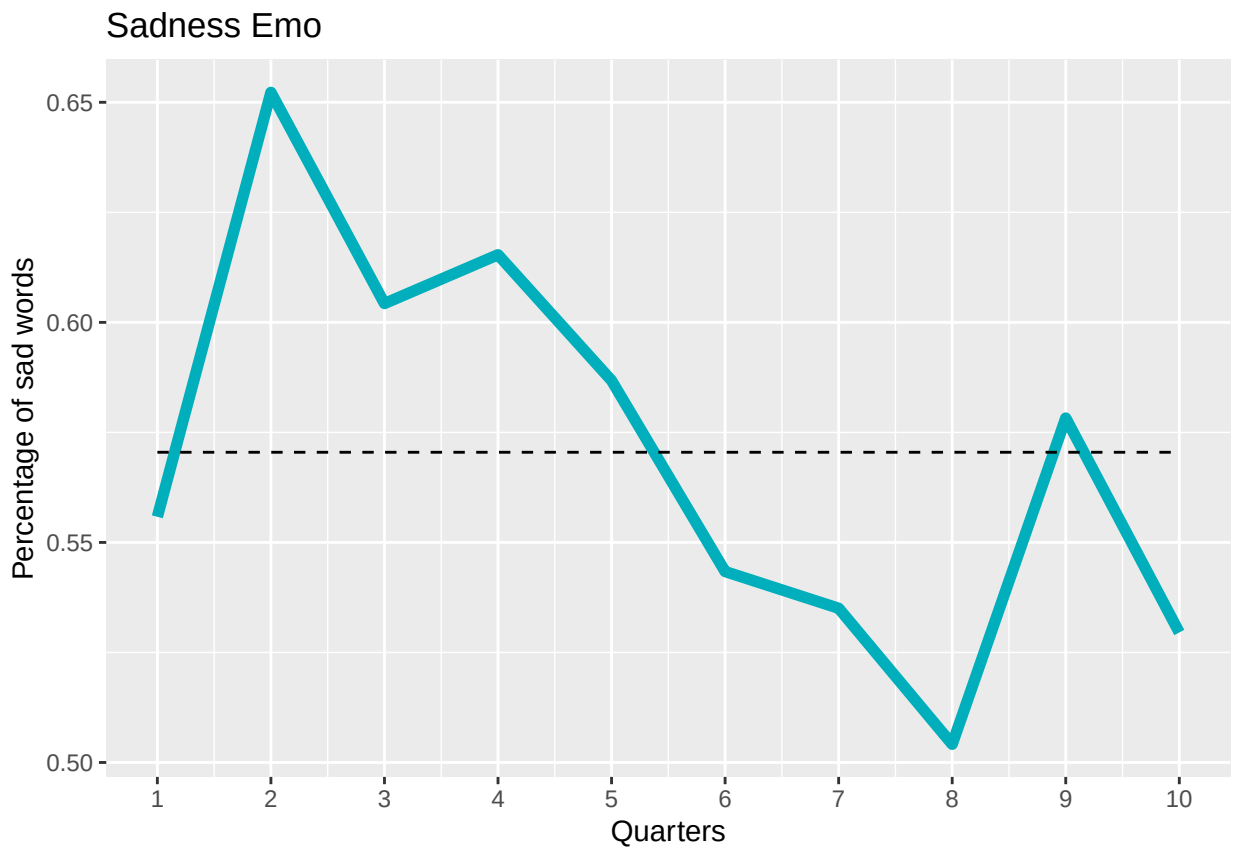
```
#Over time POSITIVE (quarters)
data_quarter_positive <- aggregate(x = data_dict_emo$positive,  # Specify data column
          by = list(data_dict_emo$quarter),  # Specify group indicator
          FUN = mean) # Specify function (i.e. mean)
data_quarter_positive$perc <- data_quarter_positive$x

mean_positive <- mean(data_quarter_positive$perc)

# plot
plot_positive <- ggplot(data = data_quarter_positive, aes(x = Group.1, y = perc))+
  geom_line(color = "#00AFBB", size = 2)+
  scale_x_continuous("Quarters", labels = as.character(data_quarter_positive$Group.1), breaks = data_qua
  geom_line(aes(x = Group.1, y = mean(perc)),linetype = "dashed")+
  ylab("Percentage of positive words")+
  labs(title = "Positive Emotion")
plot_positive
```

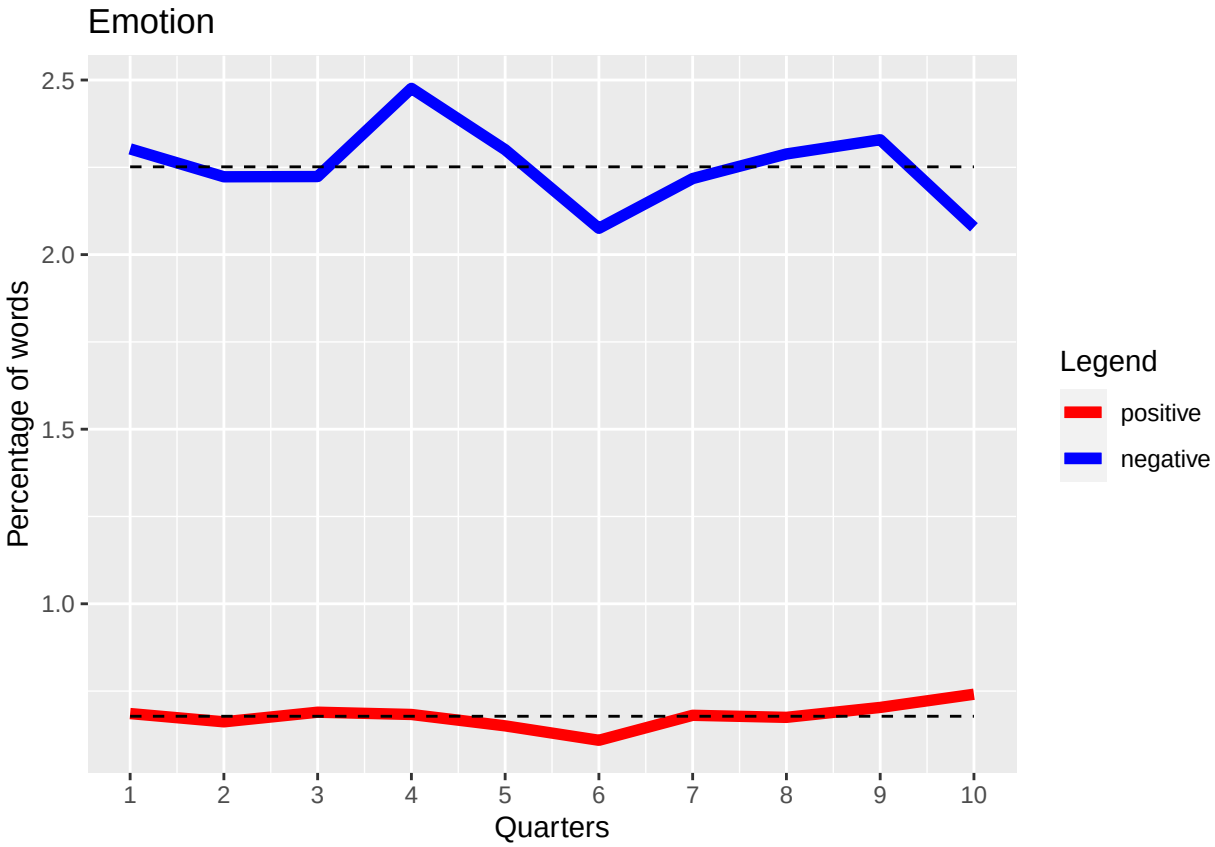

Positive Emotion
Percentage of positive words
0.70
0.65
1
2
3
4
5
6
7
8
9
10
Quarters

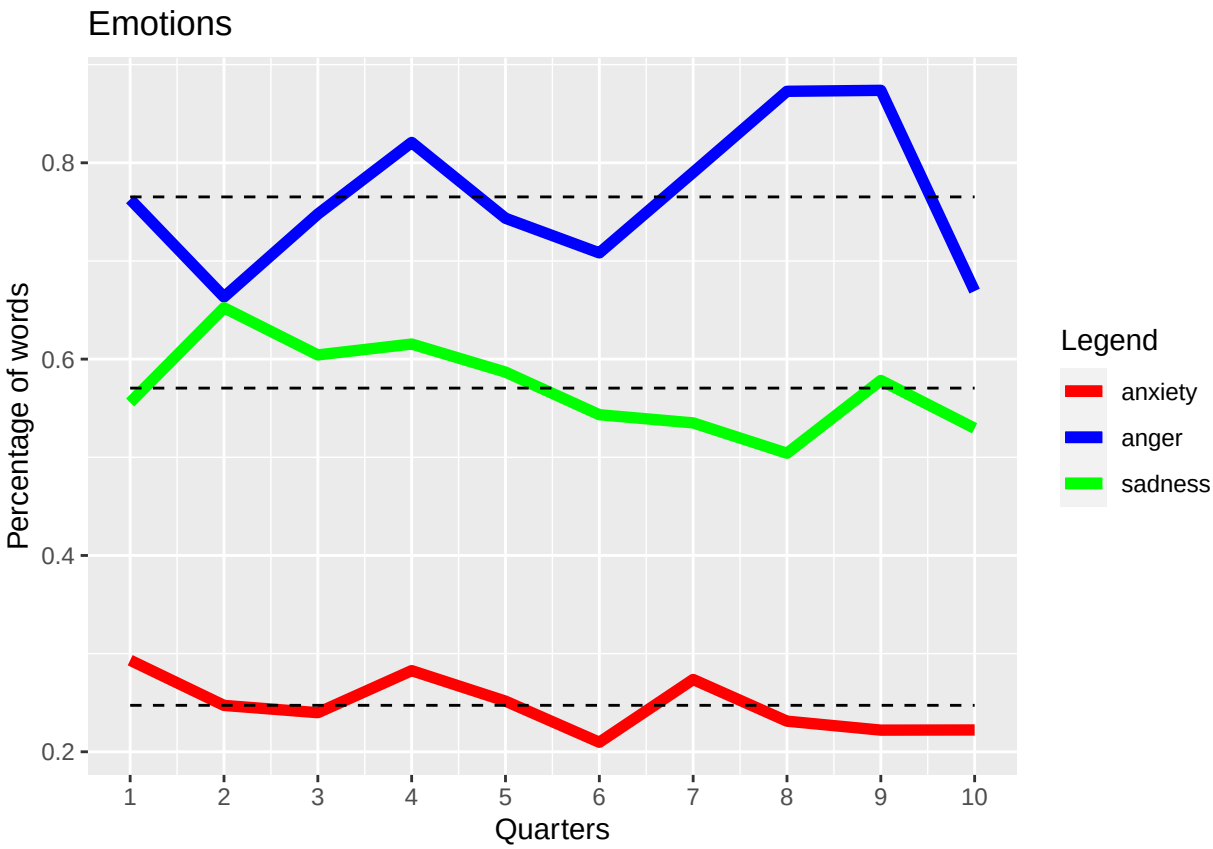

Negative Emotion
Percentage of negative words
2.4
2.3
2.2
2.1
1
2
3
4
5
6
7
8
9
10
Quarters


Anxiety emo
Percentage of anxious words
0.275
0.250
0.225
1
2
3
4
5
6
7
8
9
10
Quarters

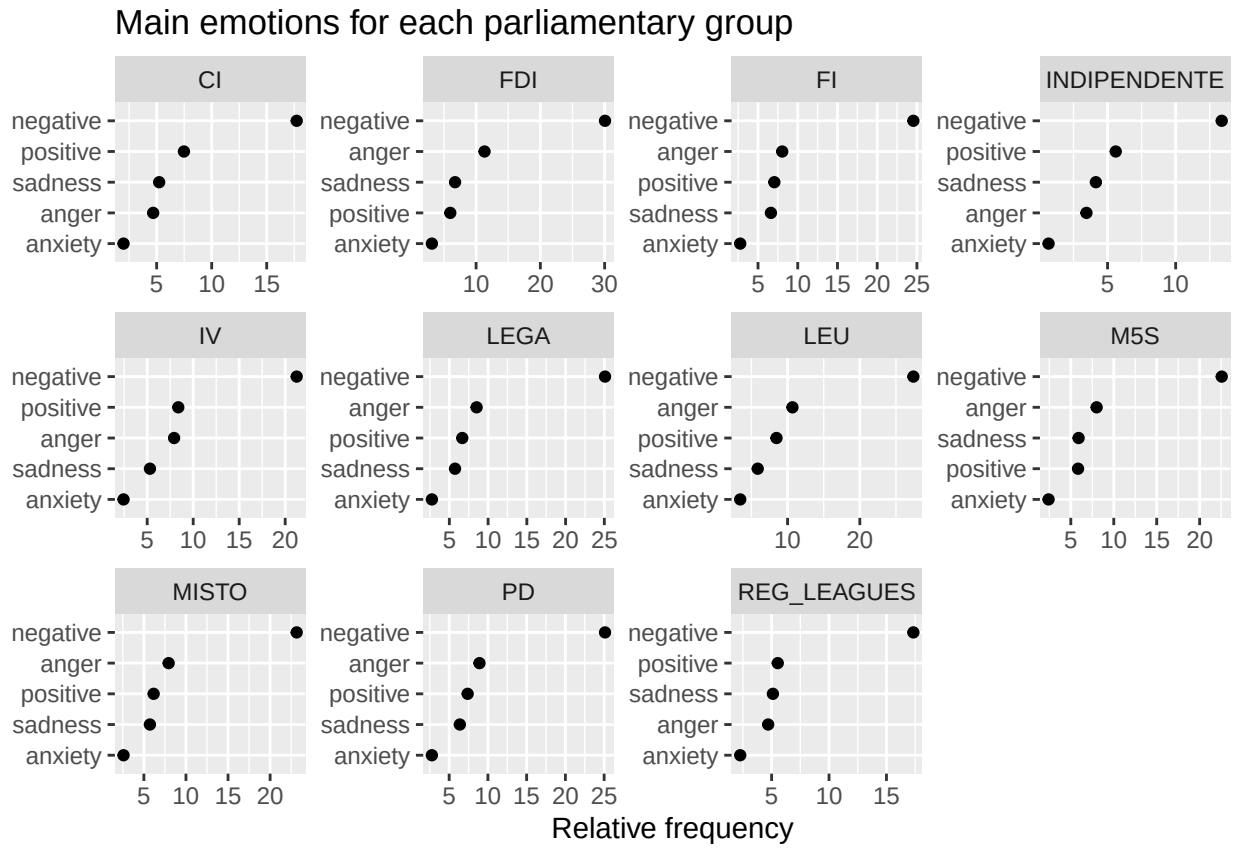

Anger emo
Percentage of anger words
0.85
0.80
0.75
0.70
1
2
3
4
5
6
7
8
9
10
Quarters


Sadness Emo
Percentage of sad words
0.65
0.60
0.55
0.50
1
2
3
4
5
6
7
8
9
10
Quarters


Emotion
Percentage of words
2.5
2.0
1.5
1.0
1
2
3
4
5
6
7
8
9
10
Quarters
Legend
positive
negative


Emotions
Percentage of words
0.8
0.6
0.4
0.2
1
2
3
4
5
6
7
8
9
10
Quarters
Legend
anxiety
anger
sadness

Main emotion for each parliamentary group



The code is only shown for 'positive' but is identical for all emotions

```
# POSITIVE
data_party_positive <- aggregate(x = data_dict_emo$positive,  # Specify data column
          by = list(data_dict_emo$party_id),  # Specify group indicator
          FUN = mean) # Specify function (i.e. mean)
data_party_positive$perc <- round(data_party_positive$x,3)

kable(data_party_positive %>%
        select(Group.1, perc) %>%
        arrange(desc(perc)), caption = "POSITIVE")
```

```
ggplot(data=data_party_positive, aes(x=Group.1, y=perc)) +
  geom_bar(stat="identity", fill="steelblue")+
  geom_text(aes(label=perc), vjust=0, color="black", size=3.5)+
  geom_abline(slope=0, intercept= mean(data_party_positive$perc),lty=2) +
  theme_minimal()+
  xlab("Parliamentary group")+
  labs(title = "Positive Emotion")+
  coord_flip()
```

Table 1: POSITIVE

Group.1	perc
LEU	0.847
IV	0.838
CI	0.748
PD	0.738
FI	0.706
LEGA	0.667
MISTO	0.616
FDI	0.598
M5S	0.584
INDIPENDENTE	0.560
REG_LEAGUES	0.554

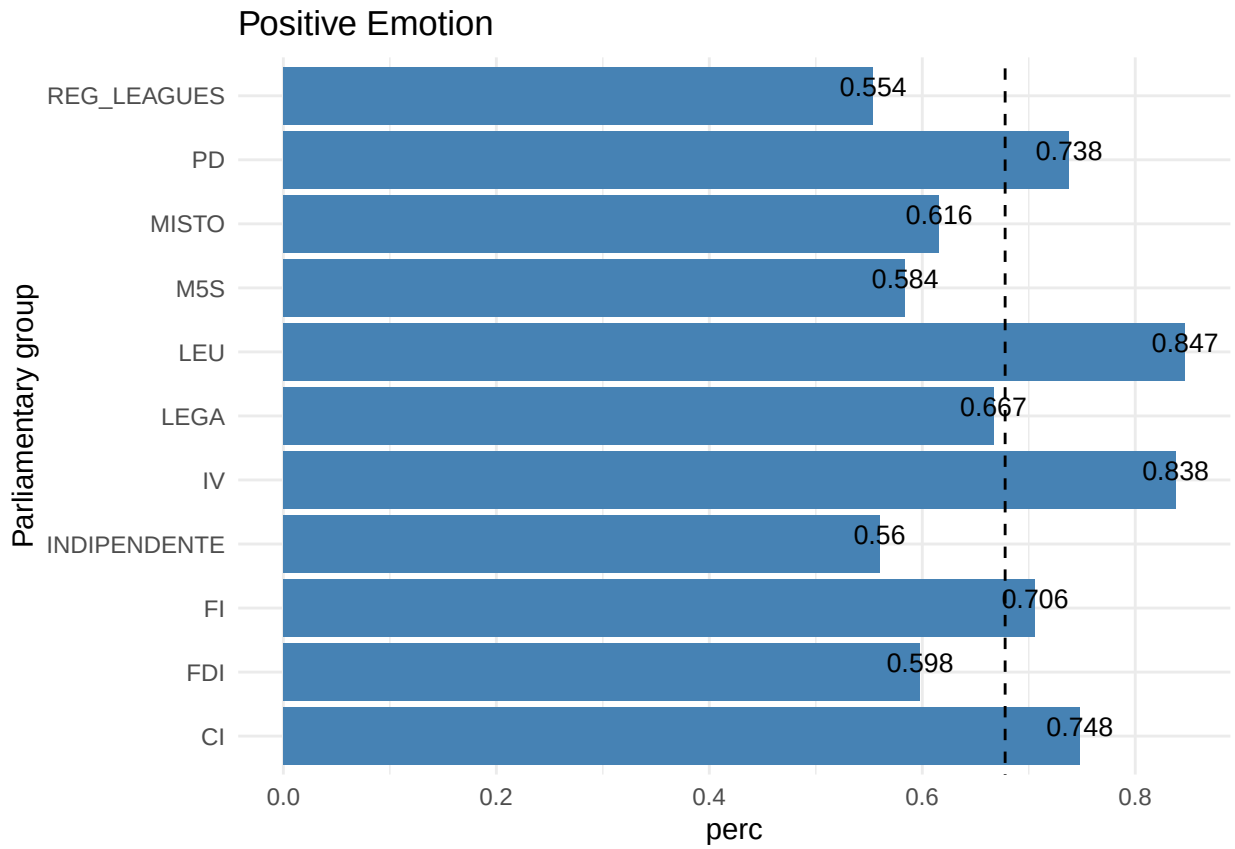


Table 2: NEGATIVE

Group.1	perc
FDI	3.006
LEU	2.741
PD	2.512
LEGA	2.509
FI	2.455
MISTO	2.316
M5S	2.257
IV	2.125
CI	1.772
REG_LEAGUES	1.734
INDIPENDENTE	1.338

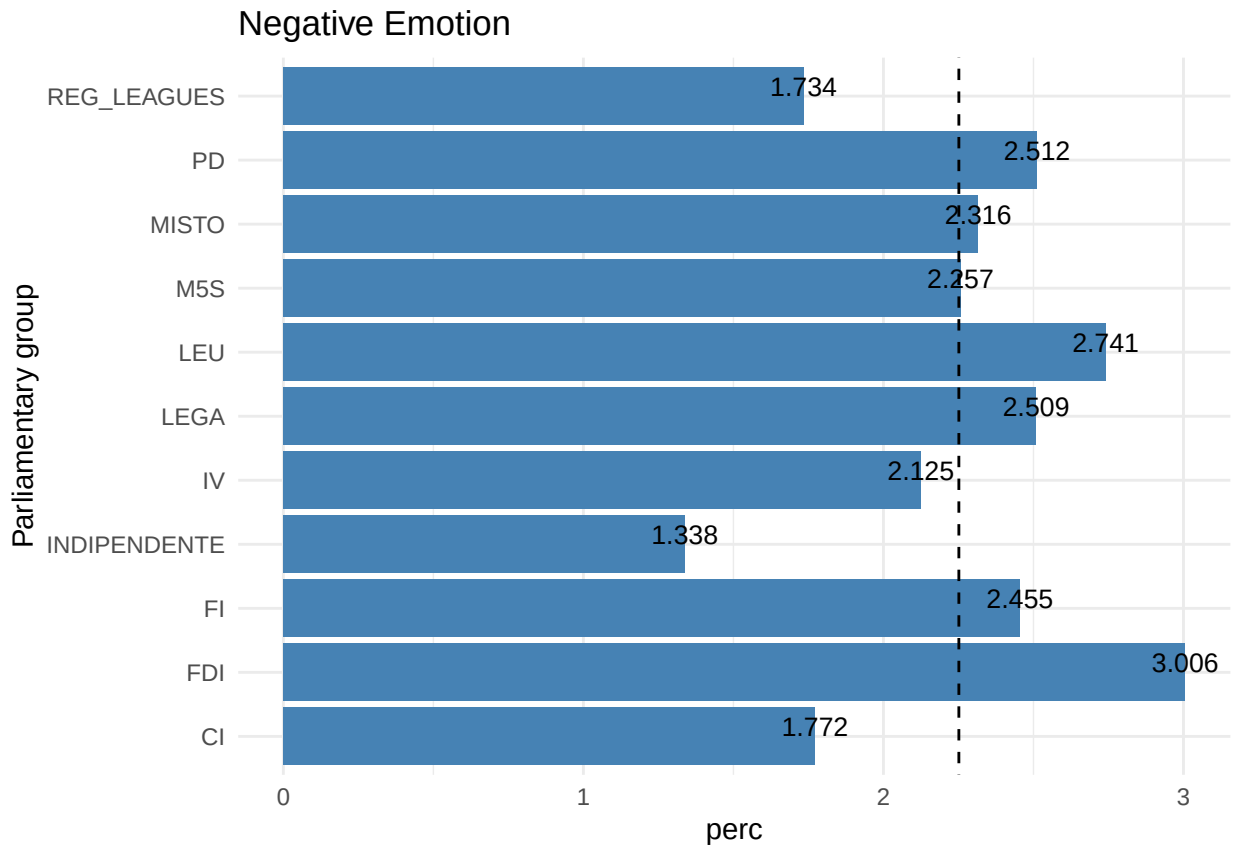


Table 3: ANXIETY

Group.1	perc
LEU	0.345
FDI	0.312
PD	0.277
FI	0.276
LEGA	0.275
MISTO	0.258
IV	0.243
M5S	0.241
REG_LEAGUES	0.227
CI	0.199
INDIPENDENTE	0.067

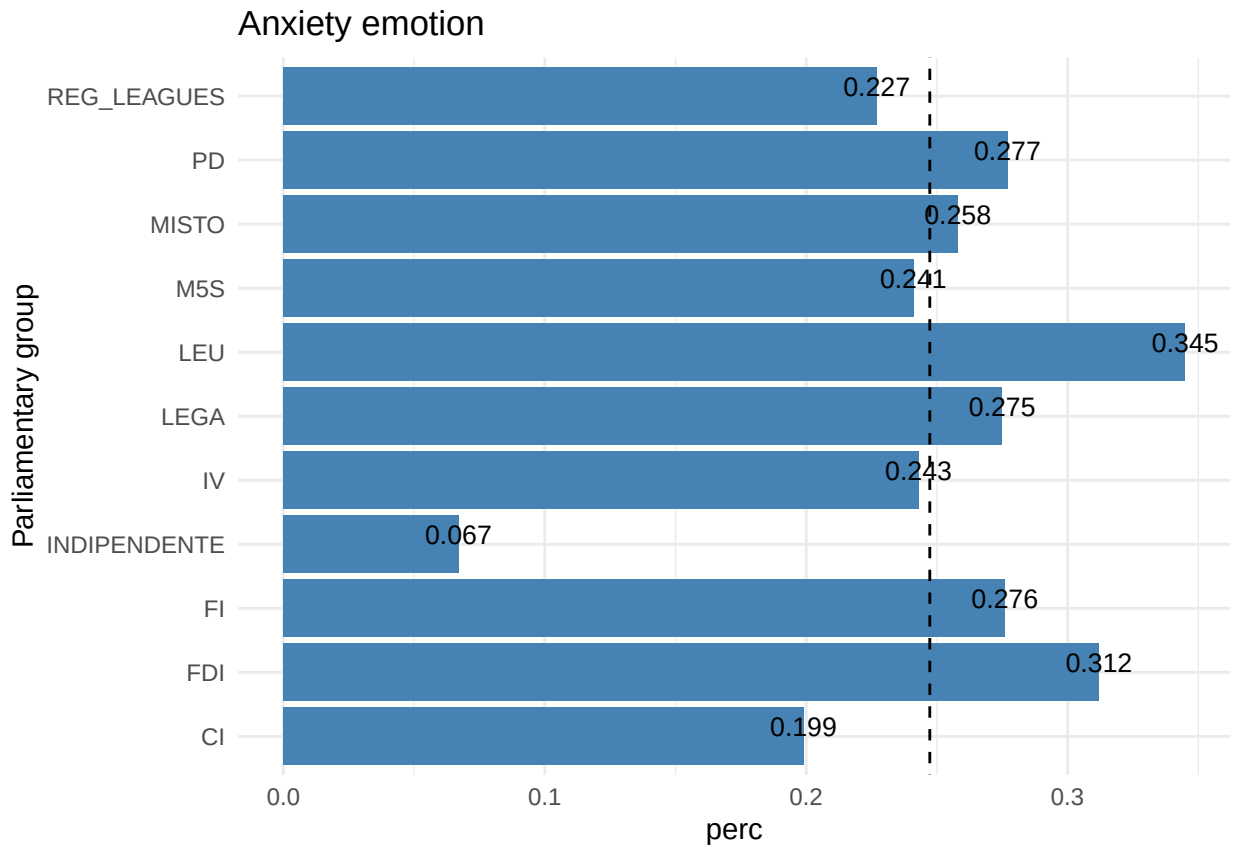


Table 4: ANGER

Group.1	perc
FDI	1.132
LEU	1.068
PD	0.891
LEGA	0.852
FI	0.805
M5S	0.801
MISTO	0.794
IV	0.793
REG_LEAGUES	0.470
CI	0.468
INDIPENDENTE	0.345

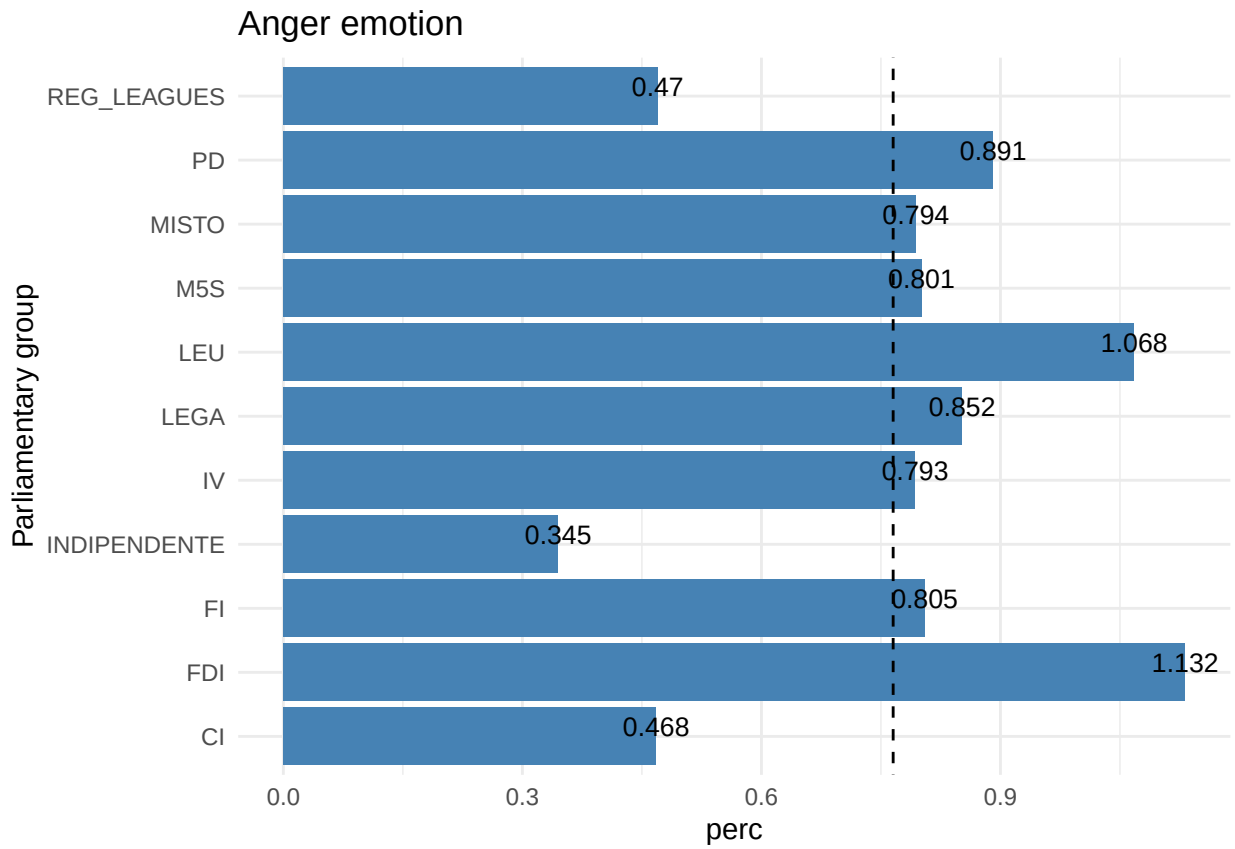
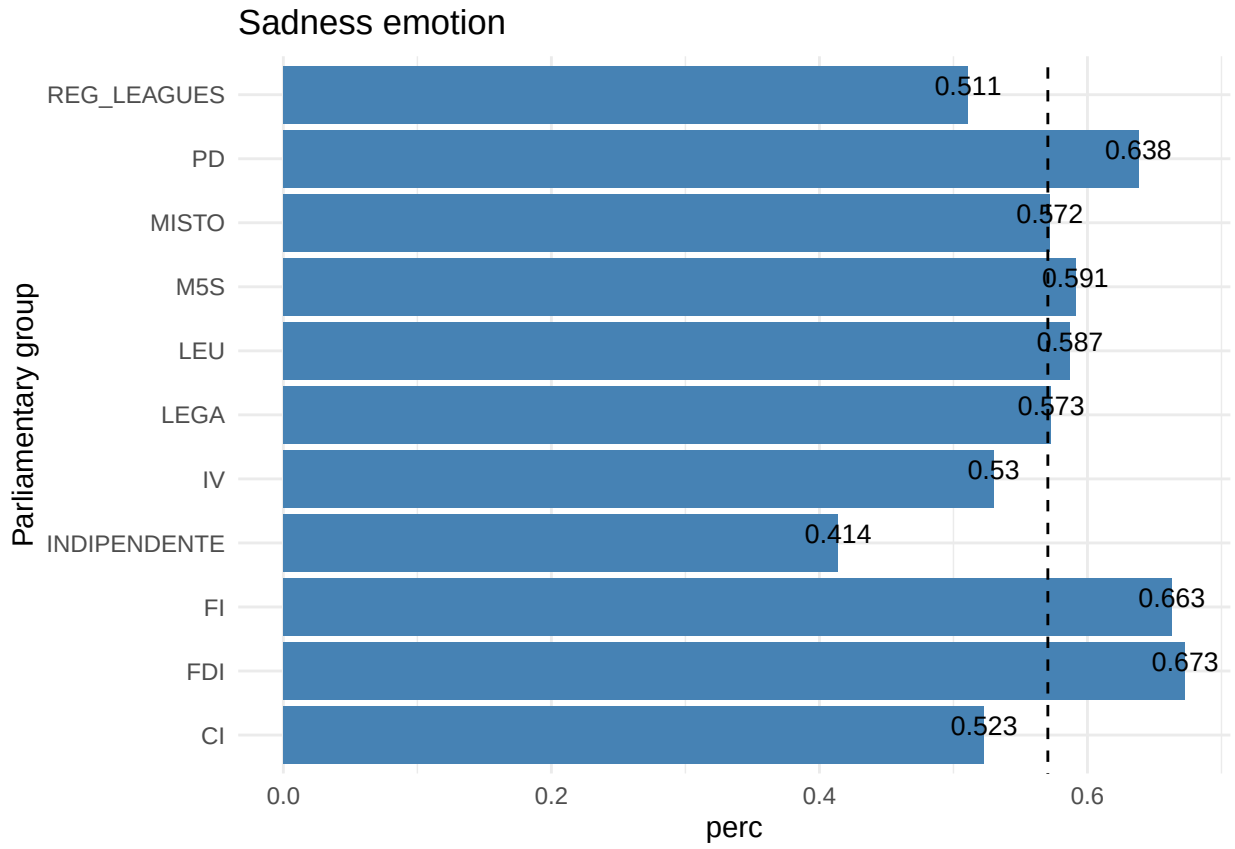


Table 5: SADNESS

Group.1	perc
FDI	0.673
FI	0.663
PD	0.638
M5S	0.591
LEU	0.587
LEGA	0.573
MISTO	0.572
IV	0.530
CI	0.523
REG_LEAGUES	0.511
INDIPENDENTE	0.414



Are the average values of positive/negative emotions for each party statistically different from each other?

The reference category is PD

```
# bivariate regression for check t-test

# create the factor variables for party and quarter
data_dict_emo$factor_party <- as.factor(data_dict_emo$party_id)
```

```r
data_dict_emo$factor_quarter <- as.factor(data_dict_emo$quarter)

# Check the mean values
summary(data_dict_emo$positive)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.3281  0.5863  0.6542  0.6778  0.7546  1.1593
```

```r
summary(data_dict_emo$negative)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.9522  1.9364  2.3318  2.2515  2.5867  3.2025
```

```r
# Set PD as reference category for party_id
data_dict_emo$factor_party <- relevel(data_dict_emo$factor_party, ref = "PD")
# Set 5 as reference category for quarter
data_dict_emo$factor_quarter <- relevel(data_dict_emo$factor_quarter, ref = "5")

# Run the regressions

# POSITIVE
positive_model <- lm(positive ~  factor_quarter + factor_party, data_dict_emo )
summary(positive_model)
```

```
##
## Call:
## lm(formula = positive ~ factor_quarter + factor_party, data = data_dict_emo)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.26194 -0.06684  0.00093  0.04680  0.33861
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)                0.710990   0.052210  13.618  < 2e-16 ***
## factor_quarter1            0.035165   0.052210   0.674  0.50234
## factor_quarter2            0.011541   0.052210   0.221  0.82556
## factor_quarter3            0.039079   0.052210   0.748  0.45611
## factor_quarter4            0.032630   0.052210   0.625  0.53358
## factor_quarter6           -0.041367   0.052210  -0.792  0.43026
## factor_quarter7            0.030252   0.052210   0.579  0.56376
## factor_quarter8            0.024362   0.052210   0.467  0.64191
## factor_quarter9            0.052797   0.052210   1.011  0.31462
## factor_quarter10           0.090541   0.052210   1.734  0.08632 .
## factor_partyCI             0.009462   0.054759   0.173  0.86321
## factor_partyFDI           -0.140003   0.054759  -2.557  0.01224 *
## factor_partyFI            -0.032835   0.054759  -0.600  0.55026
## factor_partyINDIPENDENTE -0.178239   0.054759  -3.255  0.00160 **
## factor_partyIV             0.099436   0.054759   1.816  0.07272 .
## factor_partyLEGA          -0.071907   0.054759  -1.313  0.19247
## factor_partyLEU            0.108649   0.054759   1.984  0.05029 .
## factor_partyM5S           -0.154273   0.054759  -2.817  0.00595 **
```

```
## factor_partyMISTO        -0.122489   0.054759  -2.237  0.02776 *
## factor_partyREG_LEAGUES  -0.184902   0.054759  -3.377  0.00109 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1224 on 90 degrees of freedom
## Multiple R-squared:  0.4781, Adjusted R-squared:  0.3679
## F-statistic: 4.339 on 19 and 90 DF,  p-value: 1.009e-06
```

```
#NEGATIVE
negative_model <- lm(negative ~  factor_quarter + factor_party, data_dict_emo )
summary(negative_model)
```

```
##
## Call:
## lm(formula = negative ~ factor_quarter + factor_party, data = data_dict_emo)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.79357 -0.14849  0.00431  0.15790  0.46872
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)                2.560662   0.108714  23.554  < 2e-16 ***
## factor_quarter1            0.002167   0.108714   0.020  0.98414
## factor_quarter2           -0.077716   0.108714  -0.715  0.47654
## factor_quarter3           -0.077039   0.108714  -0.709  0.48038
## factor_quarter4            0.175647   0.108714   1.616  0.10966
## factor_quarter6           -0.225225   0.108714  -2.072  0.04115 *
## factor_quarter7           -0.082757   0.108714  -0.761  0.44851
## factor_quarter8           -0.012345   0.108714  -0.114  0.90984
## factor_quarter9            0.028457   0.108714   0.262  0.79410
## factor_quarter10          -0.222362   0.108714  -2.045  0.04374 *
## factor_partyCI            -0.739253   0.114020  -6.484 4.70e-09 ***
## factor_partyFDI            0.494954   0.114020   4.341 3.71e-05 ***
## factor_partyFI            -0.056139   0.114020  -0.492  0.62366
## factor_partyINDIPENDENTE -1.173282   0.114020 -10.290  < 2e-16 ***
## factor_partyIV            -0.386425   0.114020  -3.389  0.00104 **
## factor_partyLEGA          -0.002478   0.114020  -0.022  0.98271
## factor_partyLEU            0.229343   0.114020   2.011  0.04727 *
## factor_partyM5S           -0.254663   0.114020  -2.233  0.02800 *
## factor_partyMISTO         -0.195756   0.114020  -1.717  0.08944 .
## factor_partyREG_LEAGUES   -0.777217   0.114020  -6.817 1.03e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.255 on 90 degrees of freedom
## Multiple R-squared:  0.8089, Adjusted R-squared:  0.7685
## F-statistic: 20.05 on 19 and 90 DF,  p-value: < 2.2e-16
```

Regressions

```
# import the populism dataset
load("data/data_dict1.Rda")

# add the level of populism in the dataframe with the emotions
data_dict_emo$populism <- data_dict1$populism

# Change the reference category for quarter as quarter 8
data_dict_emo$factor_quarter <- relevel(data_dict_emo$factor_quarter, ref = "8")

# Negative prevalence
negative_prevalence_model <- lm(negative_prevalence ~ factor_party +
                                  factor_quarter +
                                  populism, data_dict_emo)
summary(negative_prevalence_model)
```

```
##
## Call:
## lm(formula = negative_prevalence ~ factor_party + factor_quarter +
##     populism, data = data_dict_emo)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.83425 -0.13061 -0.01836  0.15555  0.69102
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)                1.457921   0.196396   7.423 6.51e-11 ***
## factor_partyCI            -0.687517   0.130189  -5.281 9.02e-07 ***
## factor_partyFDI            0.521583   0.136636   3.817 0.000249 ***
## factor_partyFI            -0.031204   0.127490  -0.245 0.807208
## factor_partyINDIPENDENTE -0.912110   0.132441  -6.887 7.79e-10 ***
## factor_partyIV            -0.415488   0.131061  -3.170 0.002090 **
## factor_partyLEGA           0.016135   0.129531   0.125 0.901148
## factor_partyLEU            0.128497   0.127488   1.008 0.316228
## factor_partyM5S           -0.192532   0.133586  -1.441 0.153021
## factor_partyMISTO         -0.092293   0.127711  -0.723 0.471778
## factor_partyREG_LEAGUES   -0.483682   0.135906  -3.559 0.000600 ***
## factor_quarter5            0.095929   0.124208   0.772 0.441968
## factor_quarter1           -0.020075   0.121951  -0.165 0.869623
## factor_quarter2            0.002328   0.123831   0.019 0.985041
## factor_quarter3           -0.158689   0.126302  -1.256 0.212250
## factor_quarter4            0.205304   0.122020   1.683 0.095969 .
## factor_quarter6           -0.101347   0.123132  -0.823 0.412663
## factor_quarter7           -0.103082   0.122068  -0.844 0.400675
## factor_quarter9           -0.040199   0.123641  -0.325 0.745849
## factor_quarter10          -0.250742   0.122015  -2.055 0.042810 *
## populism                   0.582670   0.253212   2.301 0.023721 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.285 on 89 degrees of freedom
```

```
## Multiple R-squared:  0.7629, Adjusted R-squared:  0.7096
## F-statistic: 14.32 on 20 and 89 DF,  p-value: < 2.2e-16
```

```
# Negative emotion
negative_model <- lm(negative ~ factor_party +
                       factor_quarter +
                       populism, data_dict_emo)
summary(negative_model)
```

```
##
## Call:
## lm(formula = negative ~ factor_party + factor_quarter + populism,
##     data = data_dict_emo)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.82801 -0.13125  0.00941  0.12134  0.50310
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 2.248269   0.171994  13.072  < 2e-16 ***
## factor_partyCI             -0.687535   0.114013  -6.030 3.65e-08 ***
## factor_partyFDI             0.399141   0.119659   3.336  0.00124 **
## factor_partyFI             -0.062815   0.111649  -0.563  0.57511
## factor_partyINDIPENDENTE -1.103196   0.115985  -9.511 3.28e-15 ***
## factor_partyIV             -0.326952   0.114777  -2.849  0.00545 **
## factor_partyLEGA           -0.047517   0.113437  -0.419  0.67631
## factor_partyLEU             0.235937   0.111648   2.113  0.03738 *
## factor_partyM5S            -0.332532   0.116988  -2.842  0.00555 **
## factor_partyMISTO          -0.211835   0.111843  -1.894  0.06147 .
## factor_partyREG_LEAGUES    -0.685412   0.119020  -5.759 1.19e-07 ***
## factor_quarter5             0.062394   0.108775   0.574  0.56768
## factor_quarter1            -0.005587   0.106799  -0.052  0.95840
## factor_quarter2            -0.018994   0.108445  -0.175  0.86136
## factor_quarter3            -0.131691   0.110609  -1.191  0.23698
## factor_quarter4             0.209609   0.106859   1.962  0.05294 .
## factor_quarter6            -0.174171   0.107833  -1.615  0.10981
## factor_quarter7            -0.093044   0.106902  -0.870  0.38644
## factor_quarter9            -0.003622   0.108279  -0.033  0.97339
## factor_quarter10           -0.188505   0.106855  -1.764  0.08114 .
## populism                    0.492414   0.221751   2.221  0.02892 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2496 on 89 degrees of freedom
## Multiple R-squared:  0.8189, Adjusted R-squared:  0.7782
## F-statistic: 20.12 on 20 and 89 DF,  p-value: < 2.2e-16
```

```
# Anxiety emotion
anxiety_model <- lm(anxiety ~ factor_party +
                      factor_quarter +
                      populism, data_dict_emo)
summary(anxiety_model)
```

```
##
## Call:
## lm(formula = anxiety ~ factor_party + factor_quarter + populism,
##     data = data_dict_emo)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.203185 -0.030062 -0.006422  0.031150  0.241173
##
## Coefficients:
##                             Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 0.2688373  0.0478034   5.624 2.13e-07 ***
## factor_partyCI             -0.0792116  0.0316883  -2.500   0.0143 *
## factor_partyFDI             0.0378298  0.0332575   1.137   0.2584
## factor_partyFI             -0.0006212  0.0310313  -0.020   0.9841
## factor_partyINDIPENDENTE -0.2119155  0.0322366  -6.574 3.24e-09 ***
## factor_partyIV             -0.0357351  0.0319007  -1.120   0.2656
## factor_partyLEGA           -0.0010955  0.0315281  -0.035   0.9724
## factor_partyLEU             0.0681484  0.0310310   2.196   0.0307 *
## factor_partyM5S            -0.0338173  0.0325152  -1.040   0.3011
## factor_partyMISTO          -0.0182670  0.0310853  -0.588   0.5583
## factor_partyREG_LEAGUES    -0.0526060  0.0330799  -1.590   0.1153
## factor_quarter5             0.0190702  0.0302326   0.631   0.5298
## factor_quarter1             0.0626135  0.0296833   2.109   0.0377 *
## factor_quarter2             0.0148207  0.0301407   0.492   0.6241
## factor_quarter3             0.0104310  0.0307423   0.339   0.7352
## factor_quarter4             0.0509013  0.0297000   1.714   0.0900 .
## factor_quarter6            -0.0225554  0.0299707  -0.753   0.4537
## factor_quarter7             0.0430576  0.0297118   1.449   0.1508
## factor_quarter9            -0.0079431  0.0300946  -0.264   0.7924
## factor_quarter10           -0.0095388  0.0296988  -0.321   0.7488
## populism                   -0.0131192  0.0616326  -0.213   0.8319
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06936 on 89 degrees of freedom
## Multiple R-squared:  0.5817, Adjusted R-squared:  0.4877
## F-statistic: 6.188 on 20 and 89 DF,  p-value: 6.176e-10
```

```
# Anger emotion
anger_model <- lm(anger ~ factor_party +
                    factor_quarter +
                    populism, data_dict_emo)
summary(anger_model)
```

```
##
## Call:
## lm(formula = anger ~ factor_party + factor_quarter + populism,
##     data = data_dict_emo)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.32401 -0.07952  0.00037  0.06871  0.48334
##
```

```
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 0.88129    0.09360   9.415 5.19e-15 ***
## factor_partyCI             -0.40239    0.06205  -6.485 4.83e-09 ***
## factor_partyFDI             0.20315    0.06512   3.120  0.00244 **
## factor_partyFI             -0.08894    0.06076  -1.464  0.14678
## factor_partyINDIPENDENTE -0.51858    0.06312  -8.215 1.57e-12 ***
## factor_partyIV             -0.07514    0.06246  -1.203  0.23221
## factor_partyLEGA           -0.05692    0.06174  -0.922  0.35900
## factor_partyLEU             0.17934    0.06076   2.951  0.00404 **
## factor_partyM5S            -0.12072    0.06367  -1.896  0.06120 .
## factor_partyMISTO          -0.10324    0.06087  -1.696  0.09337 .
## factor_partyREG_LEAGUES    -0.38502    0.06477  -5.944 5.33e-08 ***
## factor_quarter5            -0.10977    0.05920  -1.854  0.06701 .
## factor_quarter1            -0.11785    0.05812  -2.028  0.04559 *
## factor_quarter2            -0.19139    0.05902  -3.243  0.00167 **
## factor_quarter3            -0.15128    0.06020  -2.513  0.01377 *
## factor_quarter4            -0.04364    0.05816  -0.750  0.45502
## factor_quarter6            -0.14951    0.05869  -2.548  0.01256 *
## factor_quarter7            -0.09150    0.05818  -1.573  0.11934
## factor_quarter9            -0.01639    0.05893  -0.278  0.78149
## factor_quarter10           -0.19516    0.05815  -3.356  0.00116 **
## populism                    0.19253    0.12068   1.595  0.11418
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1358 on 89 degrees of freedom
## Multiple R-squared:  0.8022, Adjusted R-squared:  0.7577
## F-statistic: 18.04 on 20 and 89 DF,  p-value: < 2.2e-16
```

```
# sadness emotion
sadness_model <- lm(sadness ~ factor_party +
                      factor_quarter +
                      populism, data_dict_emo)
summary(sadness_model)
```

```
##
## Call:
## lm(formula = sadness ~ factor_party + factor_quarter + populism,
##     data = data_dict_emo)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.36628 -0.04760  0.00219  0.04560  0.36965
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 0.51962    0.08025   6.475 5.06e-09 ***
## factor_partyCI             -0.10570    0.05320  -1.987 0.049995 *
## factor_partyFDI             0.01902    0.05583   0.341 0.734222
## factor_partyFI              0.02387    0.05209   0.458 0.647930
## factor_partyINDIPENDENTE -0.21123    0.05412  -3.903 0.000184 ***
## factor_partyIV             -0.09736    0.05355  -1.818 0.072438 .
## factor_partyLEGA           -0.07186    0.05293  -1.358 0.178028
```

```
## factor_partyLEU          -0.04913    0.05209  -0.943 0.348193
## factor_partyM5S          -0.06025    0.05459  -1.104 0.272693
## factor_partyMISTO        -0.06847    0.05219  -1.312 0.192868
## factor_partyREG_LEAGUES  -0.11049    0.05553  -1.990 0.049710 *
## factor_quarter5           0.09126    0.05075   1.798 0.075556 .
## factor_quarter1           0.04824    0.04983   0.968 0.335682
## factor_quarter2           0.15611    0.05060   3.085 0.002710 **
## factor_quarter3           0.08862    0.05161   1.717 0.089436 .
## factor_quarter4           0.11495    0.04986   2.306 0.023463 *
## factor_quarter6           0.04591    0.05031   0.912 0.363979
## factor_quarter7           0.02701    0.04988   0.542 0.589448
## factor_quarter9           0.06648    0.05052   1.316 0.191568
## factor_quarter10          0.02911    0.04986   0.584 0.560799
## populism                  0.08471    0.10347   0.819 0.415138
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1164 on 89 degrees of freedom
## Multiple R-squared:  0.3902, Adjusted R-squared:  0.2532
## F-statistic: 2.847 on 20 and 89 DF,  p-value: 0.0003978
```