modelo_tfm

Ana Munoz

2024-06-22

Pre procesamiento de datos

1. Lectura de datos y formato panel

```
df <- read.csv('df_17_21_noclean.csv') %>%
  dplyr::select(year, country, total_earnings,
         total_players, pbicap,  desempleo,
         inflacion, internet, poblacion, pea,
         net_mig) %>%
  arrange(country, decreasing = FALSE)

# rango de fechas
df <- df %>%
  filter(year < as.Date("2022-01-01"))

# Filtro NA
pbicap_faltantes <- unique(df[is.na(df$pbicap), ]$country) #"Cuba" "Venezuela"
df <- df[!df$country %in% pbicap_faltantes, ]

df <- df[!df$country %in% c("Cambodia","Syrian Arab Republic","Trinidad and Tobago",
                            "Mongolia","Hong Kong"), ]
df[df$country=='Korea, Republic of', 'net_mig'][4] <- 32000 #duda porque en otra web es 0

# renombrar variables para el modelo
renombrar <- c("year", "pais", "TG", "TJ", "PIBc",
               "DEmp", "INF", "INT", "POB", "PEA", "MIG")

colnames(df) <- renombrar
```

Revision de nulos

```
sapply(df, function(x) sum(is.na(x)))
```

```
## year pais   TG   TJ PIBc DEmp  INF  INT  POB  PEA  MIG
##    0    0    0    0    0    0    0    0    0    0    0
```

Revision de total de datos

```
df %>%
  group_by(year) %>%
  summarise(count = n())
```

```
## # A tibble: 5 x 2
##   year       count
##   <chr>      <int>
## 1 2017-01-01    92
## 2 2018-01-01    92
## 3 2019-01-01    92
## 4 2020-01-01    92
## 5 2021-01-01    92
```

Descriptivo

```
# sumtable(df[,-c(1,2)], digits = 3,
#          title="Estadisticos descriptivos")
```

```
# nuevas variables
df$TJ_POB <- (df$TJ/df$POB)
df$PEA_POB <- (df$PEA/df$POB)
df$MIG_POB <- (df$MIG/df$POB)
```

```
summary(df[,-c(1,2)])
```

```
##        TG                 TJ              PIBc             DEmp
##  Min.   :      55   Min.   :   1.0   Min.   :  1243   Min.   : 0.720
##  1st Qu.:   57244   1st Qu.:  20.0   1st Qu.:  4763   1st Qu.: 3.917
##  Median :  289862   Median :  80.5   Median : 12301   Median : 5.555
##  Mean   : 1954964   Mean   : 278.2   Mean   : 22911   Mean   : 7.070
##  3rd Qu.: 1398620   3rd Qu.: 293.2   3rd Qu.: 36706   3rd Qu.: 9.037
##  Max.   :51549194   Max.   :6279.0   Max.   :133712   Max.   :28.770
##       INF               INT              POB                PEA
##  Min.   :-13.911   Min.   : 13.78   Min.   :3.434e+05   Min.   :   228127
##  1st Qu.:  1.549   1st Qu.: 65.36   1st Qu.:5.432e+06   1st Qu.:  3496121
##  Median :  2.893   Median : 79.75   Median :1.126e+07   Median :  7375306
##  Mean   :  5.382   Mean   : 75.49   Mean   :6.831e+07   Mean   : 45670295
##  3rd Qu.:  5.380   3rd Qu.: 88.93   3rd Qu.:4.765e+07   3rd Qu.: 31804312
##  Max.   :150.001   Max.   :100.00   Max.   :1.412e+09   Max.   :986411437
##       MIG               TJ_POB             PEA_POB          MIG_POB
##  Min.   :-1574581   Min.   :6.040e-09   Min.   :0.5718   Min.   :-0.0582915
##  1st Qu.:  -16753   1st Qu.:1.616e-06   1st Qu.:0.6409   1st Qu.:-0.0013823
##  Median :    3094   Median :5.845e-06   Median :0.6558   Median : 0.0001741
##  Mean   :   15616   Mean   :1.274e-05   Mean   :0.6624   Mean   : 0.0008615
##  3rd Qu.:   35468   3rd Qu.:1.543e-05   3rd Qu.:0.6793   3rd Qu.: 0.0034413
##  Max.   : 1377630   Max.   :1.276e-04   Max.   :0.8460   Max.   : 0.0341062
```

3. Normalizacion con logaritmo

- valores con varianzas muy grandes
- aplico normalizacion logaritmica en algunas variables

```
df_standar <- df %>%
  mutate(across(c("TG", "PIBc", "POB", "PEA", "TJ", "TJ_POB", "PEA_POB"), ~log(.)))%>%
  mutate(year = year(df$year))

summary(df_standar)
```

```
##       year          pais                TG               TJ
##  Min.   :2017   Length:460         Min.   : 4.006   Min.   :0.000
##  1st Qu.:2018   Class :character   1st Qu.:10.955   1st Qu.:2.996
##  Median :2019   Mode  :character   Median :12.577   Median :4.388
##  Mean   :2019                      Mean   :12.471   Mean   :4.317
##  3rd Qu.:2020                      3rd Qu.:14.151   3rd Qu.:5.681
##  Max.   :2021                      Max.   :17.758   Max.   :8.745
##       PIBc             DEmp             INF              INT
##  Min.   : 7.125   Min.   : 0.720   Min.   :-13.911   Min.   : 13.78
##  1st Qu.: 8.469   1st Qu.: 3.917   1st Qu.:  1.549   1st Qu.: 65.36
##  Median : 9.417   Median : 5.555   Median :  2.893   Median : 79.75
##  Mean   : 9.456   Mean   : 7.070   Mean   :  5.382   Mean   : 75.49
##  3rd Qu.:10.511   3rd Qu.: 9.037   3rd Qu.:  5.380   3rd Qu.: 88.93
##  Max.   :11.803   Max.   :28.770   Max.   :150.001   Max.   :100.00
##       POB              PEA              MIG               TJ_POB
##  Min.   :12.75   Min.   :12.34   Min.   :-1574581   Min.   :-18.925
##  1st Qu.:15.51   1st Qu.:15.07   1st Qu.:  -16753   1st Qu.:-13.335
##  Median :16.24   Median :15.81   Median :    3094   Median :-12.050
##  Mean   :16.58   Mean   :16.16   Mean   :   15616   Mean   :-12.258
##  3rd Qu.:17.68   3rd Qu.:17.27   3rd Qu.:   35468   3rd Qu.:-11.079
##  Max.   :21.07   Max.   :20.71   Max.   : 1377630   Max.   : -8.967
##     PEA_POB           MIG_POB
##  Min.   :-0.5590   Min.   :-0.0582915
##  1st Qu.:-0.4448   1st Qu.:-0.0013823
##  Median :-0.4219   Median : 0.0001741
##  Mean   :-0.4135   Mean   : 0.0008615
##  3rd Qu.:-0.3866   3rd Qu.: 0.0034413
##  Max.   :-0.1673   Max.   : 0.0341062
```

0. Preparando los datos

- Tenemos datos panel con la siguente forma 90 paises 5 anios y estas columnas
- Nuestro panel es balanceado y corto

```
dim(table(df_standar$pais,df_standar$year))
```

```
## [1] 92  5
```

```
colnames(df_standar)
```

```
##  [1] "year"    "pais"    "TG"      "TJ"      "PIBc"    "DEmp"    "INF"
##  [8] "INT"     "POB"     "PEA"     "MIG"     "TJ_POB"  "PEA_POB" "MIG_POB"
```

- definimos las variables para el modelo

```
attach(df_standar)
Y <- cbind(TG)
X <- cbind(PIBc, INT, DEmp, INF, TJ_POB, PEA_POB, MIG_POB)

df_panel <- pdata.frame(df_standar,
                        index=c('pais','year'))

# para las validaciones
#######
datos_2 = data.frame(Y, X, pais)
write.table(datos_2, "02_datos.txt", sep=";", row.names=F)
#######

head(df_panel,3)
```

```
##              year    pais        TG        TJ     PIBc  DEmp      INF      INT
## Albania-2017 2017 Albania  7.961426 0.6931472 8.418705 13.62 1.450732 62.40000
## Albania-2018 2018 Albania  7.205301 1.0986123 8.573131 12.30 1.472953 65.40000
## Albania-2019 2019 Albania 10.531019 2.6390573 8.593453 11.47 1.257025 68.55039
##                   POB      PEA   MIG    TJ_POB    PEA_POB      MIG_POB
## Albania-2017 14.87103 14.48765 -9768 -14.17788 -0.3833763 -0.003399390
## Albania-2018 14.86856 14.48388 -9106 -13.76995 -0.3846839 -0.003176834
## Albania-2019 14.86430 14.47713 -8889 -12.22524 -0.3871680 -0.003114368
```

1. Efectos Fijos

```
fijos <- plm(Y ~ X, data=df_panel, index=c('pais','year'), model= "within")
# summary(fijos)
```

2. Efectos aleatorios

```
random <- plm(Y ~ X, data=df_panel, index=c('pais','year'), model= "random")
# summary(random)
```

3. MCO

```
mco_pool = plm(Y ~ X, data=df_panel,index=c("state", "year"), model="pooling")
mco = lm(Y ~ X, data=df_panel)
# summary(mco)
```

Test para escoger el mejor modelo

1. F test

- H0: modelo (MCO) vs H1: efectos fijos
- p<0.05 entonces rechazo Ho, el mejor modelo seria efectos fijos

```
pFtest(fijos, mco)
```

```
##
##  F test for individual effects
##
## data:  Y ~ X
## F = 32.956, df1 = 91, df2 = 361, p-value < 2.2e-16
## alternative hypothesis: significant effects
```

2. Breusch-Pagan

- H0: modelo agrupado (MCO) vs H1: efectos aleatorios
- p<0.05 entonces rechazo la Ho, por ahora el mejor modelo seria aleatorios

```
plmtest(mco_pool, type=c("bp"))
```

```
##
##  Lagrange Multiplier Test - (Breusch-Pagan)
##
## data:  Y ~ X
## chisq = 649.43, df = 1, p-value < 2.2e-16
## alternative hypothesis: significant effects
```

3. Hausman test

- H0: efectos aleatorios vs H1: efectos fijos
- p<0.05 entonces rechazo Ho y decido que efectos fijos es mejor

```
phtest(fijos, random)
```

```
##
##  Hausman Test
##
## data:  Y ~ X
## chisq = 39.202, df = 7, p-value = 1.789e-06
## alternative hypothesis: one model is inconsistent
```

Regresiones

Regresieon con efectos fijos

by pais Spain

```
df_panel$pais <- relevel(df_panel$pais, ref = "Spain")
regresion_pais_sp = lm(Y ~ X + factor(pais), data = df_panel)

# summary(regresion_pais)


p_values <- summary(regresion_pais_sp)$coefficients[,4]
coeficiente <- summary(regresion_pais_sp)$coefficients[,1]

no_significativo <- names(p_values)[which(p_values > 0.05)]

significativo_positivos <- names(p_values)[which(p_values < 0.05 & coeficiente>0)]

significativo_negativos <- names(p_values)[which(p_values < 0.05 & coeficiente<0)]
```

```
summary(regresion_pais_sp)
```

```
##
## Call:
## lm(formula = Y ~ X + factor(pais), data = df_panel)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.76996 -0.36105 -0.02916  0.32902  2.84409
##
## Coefficients:
##                                          Estimate Std. Error t value
## (Intercept)                             21.065039   4.823295   4.367
## XPIBc                                    0.769572   0.411327   1.871
## XINT                                     0.035852   0.007456   4.808
## XDEmp                                   -0.065721   0.034901  -1.883
## XINF                                     0.004736   0.005246   0.903
## XTJ_POB                                  1.025040   0.084437  12.140
## XPEA_POB                                12.473900   5.503209   2.267
## XMIG_POB                                -7.188313   8.081750  -0.889
## factor(pais)Albania                     -2.144663   0.843753  -2.542
## factor(pais)Algeria                      2.618401   0.985977   2.656
## factor(pais)Argentina                    0.831639   0.683290   1.217
## factor(pais)Armenia                     -0.811489   0.904649  -0.897
## factor(pais)Australia                   -1.317981   0.597802  -2.205
## factor(pais)Austria                     -2.706809   0.604721  -4.476
## factor(pais)Azerbaijan                  -2.017365   1.041847  -1.936
## factor(pais)Bahrain                     -6.018967   1.196906  -5.029
## factor(pais)Bangladesh                   2.654461   1.271201   2.088
## factor(pais)Belarus                     -0.718528   0.917352  -0.783
## factor(pais)Belgium                     -1.907331   0.574777  -3.318
```

```
## factor(pais)Bolivia                              1.862281   1.149941   1.619
## factor(pais)Bosnia and Herzegovina               0.506333   0.762587   0.664
## factor(pais)Brazil                               2.637609   0.745351   3.539
## factor(pais)Bulgaria                             0.896528   0.796969   1.125
## factor(pais)Canada                              -0.603843   0.566714  -1.066
## factor(pais)Chile                               -1.693578   0.672409  -2.519
## factor(pais)China                                5.436857   0.836287   6.501
## factor(pais)Colombia                             0.852314   0.830547   1.026
## factor(pais)Costa Rica                          -3.279044   0.653329  -5.019
## factor(pais)Croatia                             -1.267382   0.633345  -2.001
## factor(pais)Czech Republic                      -1.726594   0.678200  -2.546
## factor(pais)Denmark                             -1.634979   0.629256  -2.598
## factor(pais)Dominican Republic                  -0.073878   0.828520  -0.089
## factor(pais)Ecuador                              0.084063   0.937223   0.090
## factor(pais)Egypt                                3.465728   1.148155   3.019
## factor(pais)Estonia                             -2.447960   0.631293  -3.878
## factor(pais)Finland                             -1.067171   0.631063  -1.691
## factor(pais)France                               1.305914   0.620434   2.105
## factor(pais)Georgia                             -1.731973   0.903558  -1.917
## factor(pais)Germany                              0.171319   0.614796   0.279
## factor(pais)Greece                              -0.500276   0.553675  -0.904
## factor(pais)Guatemala                            1.164119   1.142178   1.019
## factor(pais)Hungary                             -2.144792   0.691082  -3.104
## factor(pais)Iceland                             -7.675532   0.670868 -11.441
## factor(pais)India                                6.167992   1.237244   4.985
## factor(pais)Indonesia                            3.705709   1.059920   3.496
## factor(pais)Iran, Islamic Republic of            0.310060   1.007559   0.308
## factor(pais)Iraq                                 4.279204   1.192420   3.589
## factor(pais)Ireland                             -3.495248   0.654849  -5.337
## factor(pais)Israel                              -0.296378   0.734765  -0.403
## factor(pais)Italy                                0.889506   0.538354   1.652
## factor(pais)Japan                                2.014307   0.833840   2.416
## factor(pais)Jordan                               4.286066   0.959388   4.467
## factor(pais)Kazakhstan                           0.862337   0.814455   1.059
## factor(pais)Korea, Republic of                  -0.813170   0.861786  -0.944
## factor(pais)Kuwait                              -5.721402   1.071966  -5.337
## factor(pais)Kyrgyzstan                           1.811739   1.521138   1.191
## factor(pais)Lao People's Democratic Republic    -0.346902   1.245702  -0.278
## factor(pais)Latvia                              -3.090577   0.650984  -4.748
## factor(pais)Lebanon                              0.958431   0.846782   1.132
## factor(pais)Lithuania                           -3.029636   0.614659  -4.929
## factor(pais)Luxembourg                          -8.342336   0.838396  -9.950
## factor(pais)Macao                               -5.553994   1.042911  -5.325
## factor(pais)Malaysia                            -0.130647   0.863736  -0.151
## factor(pais)Malta                               -7.343612   0.671328 -10.939
## factor(pais)Mexico                               2.190249   0.803229   2.727
## factor(pais)Moldova, Republic of                -0.760414   1.106059  -0.687
## factor(pais)Morocco                              1.173170   1.037621   1.131
## factor(pais)Netherlands                         -1.759174   0.617435  -2.849
## factor(pais)New Zealand                         -3.011032   0.595430  -5.057
## factor(pais)Nicaragua                            1.671960   1.296453   1.290
## factor(pais)North Macedonia                     -1.177932   0.783688  -1.503
## factor(pais)Norway                              -3.134177   0.677036  -4.629
## factor(pais)Pakistan                             8.035436   1.604058   5.009
```

```
## factor(pais)Panama                          -2.361322   0.624309  -3.782
## factor(pais)Paraguay                        -2.447527   0.916895  -2.669
## factor(pais)Peru                             1.666994   0.903885   1.844
## factor(pais)Philippines                      4.575134   1.187240   3.854
## factor(pais)Poland                           0.042422   0.717564   0.059
## factor(pais)Portugal                        -1.661270   0.587557  -2.827
## factor(pais)Romania                         -0.289316   0.721707  -0.401
## factor(pais)Russian Federation               2.093125   0.766138   2.732
## factor(pais)Saudi Arabia                    -0.779182   0.803086  -0.970
## factor(pais)Singapore                       -5.221901   1.072661  -4.868
## factor(pais)Slovakia                        -2.261850   0.634800  -3.563
## factor(pais)Slovenia                        -2.301782   0.596219  -3.861
## factor(pais)South Africa                     2.221751   0.769873   2.886
## factor(pais)Sri Lanka                       -0.144985   1.048528  -0.138
## factor(pais)Sweden                          -0.943663   0.622757  -1.515
## factor(pais)Switzerland                     -3.530504   0.688291  -5.129
## factor(pais)Thailand                         0.811658   1.029298   0.789
## factor(pais)Tunisia                          0.597933   0.930453   0.643
## factor(pais)Turkey                           1.578875   0.685848   2.302
## factor(pais)Ukraine                          2.761286   1.020552   2.706
## factor(pais)United Arab Emirates            -6.532789   1.582584  -4.128
## factor(pais)United Kingdom                   0.193511   0.608121   0.318
## factor(pais)United States                    1.388264   0.623991   2.225
## factor(pais)Uruguay                         -2.378991   0.580917  -4.095
## factor(pais)Uzbekistan                       2.406816   1.321156   1.822
## factor(pais)Viet Nam                         1.561941   1.191821   1.311
##                                             Pr(>|t|)
## (Intercept)                                 1.65e-05 ***
## XPIBc                                       0.062161 .
## XINT                                        2.24e-06 ***
## XDEmp                                       0.060494 .
## XINF                                        0.367257
## XTJ_POB                                      < 2e-16 ***
## XPEA_POB                                    0.024002 *
## XMIG_POB                                    0.374354
## factor(pais)Albania                         0.011445 *
## factor(pais)Algeria                         0.008267 **
## factor(pais)Argentina                       0.224357
## factor(pais)Armenia                         0.370306
## factor(pais)Australia                       0.028104 *
## factor(pais)Austria                         1.02e-05 ***
## factor(pais)Azerbaijan                      0.053607 .
## factor(pais)Bahrain                         7.79e-07 ***
## factor(pais)Bangladesh                      0.037485 *
## factor(pais)Belarus                         0.433986
## factor(pais)Belgium                         0.000998 ***
## factor(pais)Bolivia                         0.106222
## factor(pais)Bosnia and Herzegovina          0.507135
## factor(pais)Brazil                          0.000455 ***
## factor(pais)Bulgaria                        0.261369
## factor(pais)Canada                          0.287355
## factor(pais)Chile                           0.012211 *
## factor(pais)China                           2.65e-10 ***
## factor(pais)Colombia                        0.305480
```

```
## factor(pais)Costa Rica                          8.17e-07 ***
## factor(pais)Croatia                             0.046131 *
## factor(pais)Czech Republic                      0.011316 *
## factor(pais)Denmark                             0.009753 **
## factor(pais)Dominican Republic                  0.928998
## factor(pais)Ecuador                             0.928580
## factor(pais)Egypt                               0.002721 **
## factor(pais)Estonia                             0.000125 ***
## factor(pais)Finland                             0.091687 .
## factor(pais)France                              0.035996 *
## factor(pais)Georgia                             0.056048 .
## factor(pais)Germany                             0.780665
## factor(pais)Greece                              0.366834
## factor(pais)Guatemala                           0.308786
## factor(pais)Hungary                             0.002063 **
## factor(pais)Iceland                              < 2e-16 ***
## factor(pais)India                               9.63e-07 ***
## factor(pais)Indonesia                           0.000531 ***
## factor(pais)Iran, Islamic Republic of           0.758462
## factor(pais)Iraq                                0.000378 ***
## factor(pais)Ireland                             1.67e-07 ***
## factor(pais)Israel                              0.686919
## factor(pais)Italy                               0.099349 .
## factor(pais)Japan                               0.016201 *
## factor(pais)Jordan                              1.06e-05 ***
## factor(pais)Kazakhstan                          0.290403
## factor(pais)Korea, Republic of                  0.346012
## factor(pais)Kuwait                              1.67e-07 ***
## factor(pais)Kyrgyzstan                          0.234420
## factor(pais)Lao People's Democratic Republic    0.780804
## factor(pais)Latvia                              2.97e-06 ***
## factor(pais)Lebanon                             0.258448
## factor(pais)Lithuania                           1.26e-06 ***
## factor(pais)Luxembourg                           < 2e-16 ***
## factor(pais)Macao                               1.77e-07 ***
## factor(pais)Malaysia                            0.879857
## factor(pais)Malta                                < 2e-16 ***
## factor(pais)Mexico                              0.006707 **
## factor(pais)Moldova, Republic of                0.492210
## factor(pais)Morocco                             0.258960
## factor(pais)Netherlands                         0.004635 **
## factor(pais)New Zealand                         6.79e-07 ***
## factor(pais)Nicaragua                           0.198001
## factor(pais)North Macedonia                     0.133697
## factor(pais)Norway                              5.13e-06 ***
## factor(pais)Pakistan                            8.56e-07 ***
## factor(pais)Panama                              0.000182 ***
## factor(pais)Paraguay                            0.007943 **
## factor(pais)Peru                                0.065965 .
## factor(pais)Philippines                         0.000138 ***
## factor(pais)Poland                              0.952890
## factor(pais)Portugal                            0.004954 **
## factor(pais)Romania                             0.688747
## factor(pais)Russian Federation                  0.006604 **
```

```
## factor(pais)Saudi Arabia                    0.332579
## factor(pais)Singapore                       1.69e-06 ***
## factor(pais)Slovakia                        0.000416 ***
## factor(pais)Slovenia                        0.000134 ***
## factor(pais)South Africa                    0.004138 **
## factor(pais)Sri Lanka                       0.890100
## factor(pais)Sweden                          0.130572
## factor(pais)Switzerland                     4.75e-07 ***
## factor(pais)Thailand                        0.430890
## factor(pais)Tunisia                         0.520875
## factor(pais)Turkey                          0.021899 *
## factor(pais)Ukraine                         0.007140 **
## factor(pais)United Arab Emirates            4.55e-05 ***
## factor(pais)United Kingdom                  0.750508
## factor(pais)United States                   0.026711 *
## factor(pais)Uruguay                         5.21e-05 ***
## factor(pais)Uzbekistan                      0.069320 .
## factor(pais)Viet Nam                        0.190843
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7425 on 361 degrees of freedom
## Multiple R-squared:  0.9254, Adjusted R-squared:  0.9052
## F-statistic:  45.7 on 98 and 361 DF,  p-value: < 2.2e-16
```

Analizando significancias

```
no_significativo
```

```
##  [1] "XPIBc"
##  [2] "XDEmp"
##  [3] "XINF"
##  [4] "XMIG_POB"
##  [5] "factor(pais)Argentina"
##  [6] "factor(pais)Armenia"
##  [7] "factor(pais)Azerbaijan"
##  [8] "factor(pais)Belarus"
##  [9] "factor(pais)Bolivia"
## [10] "factor(pais)Bosnia and Herzegovina"
## [11] "factor(pais)Bulgaria"
## [12] "factor(pais)Canada"
## [13] "factor(pais)Colombia"
## [14] "factor(pais)Dominican Republic"
## [15] "factor(pais)Ecuador"
## [16] "factor(pais)Finland"
## [17] "factor(pais)Georgia"
## [18] "factor(pais)Germany"
## [19] "factor(pais)Greece"
## [20] "factor(pais)Guatemala"
## [21] "factor(pais)Iran, Islamic Republic of"
## [22] "factor(pais)Israel"
## [23] "factor(pais)Italy"
```

```
## [24] "factor(pais)Kazakhstan"
## [25] "factor(pais)Korea, Republic of"
## [26] "factor(pais)Kyrgyzstan"
## [27] "factor(pais)Lao People's Democratic Republic"
## [28] "factor(pais)Lebanon"
## [29] "factor(pais)Malaysia"
## [30] "factor(pais)Moldova, Republic of"
## [31] "factor(pais)Morocco"
## [32] "factor(pais)Nicaragua"
## [33] "factor(pais)North Macedonia"
## [34] "factor(pais)Peru"
## [35] "factor(pais)Poland"
## [36] "factor(pais)Romania"
## [37] "factor(pais)Saudi Arabia"
## [38] "factor(pais)Sri Lanka"
## [39] "factor(pais)Sweden"
## [40] "factor(pais)Thailand"
## [41] "factor(pais)Tunisia"
## [42] "factor(pais)United Kingdom"
## [43] "factor(pais)Uzbekistan"
## [44] "factor(pais)Viet Nam"
```

```
significativo_positivos
```

```
##  [1] "(Intercept)"                   "XINT"
##  [3] "XTJ_POB"                       "XPEA_POB"
##  [5] "factor(pais)Algeria"           "factor(pais)Bangladesh"
##  [7] "factor(pais)Brazil"            "factor(pais)China"
##  [9] "factor(pais)Egypt"             "factor(pais)France"
## [11] "factor(pais)India"             "factor(pais)Indonesia"
## [13] "factor(pais)Iraq"              "factor(pais)Japan"
## [15] "factor(pais)Jordan"            "factor(pais)Mexico"
## [17] "factor(pais)Pakistan"          "factor(pais)Philippines"
## [19] "factor(pais)Russian Federation" "factor(pais)South Africa"
## [21] "factor(pais)Turkey"            "factor(pais)Ukraine"
## [23] "factor(pais)United States"
```

```
significativo_negativos
```

```
##  [1] "factor(pais)Albania"             "factor(pais)Australia"
##  [3] "factor(pais)Austria"             "factor(pais)Bahrain"
##  [5] "factor(pais)Belgium"             "factor(pais)Chile"
##  [7] "factor(pais)Costa Rica"          "factor(pais)Croatia"
##  [9] "factor(pais)Czech Republic"      "factor(pais)Denmark"
## [11] "factor(pais)Estonia"             "factor(pais)Hungary"
## [13] "factor(pais)Iceland"             "factor(pais)Ireland"
## [15] "factor(pais)Kuwait"              "factor(pais)Latvia"
## [17] "factor(pais)Lithuania"           "factor(pais)Luxembourg"
## [19] "factor(pais)Macao"               "factor(pais)Malta"
## [21] "factor(pais)Netherlands"         "factor(pais)New Zealand"
## [23] "factor(pais)Norway"              "factor(pais)Panama"
## [25] "factor(pais)Paraguay"            "factor(pais)Portugal"
## [27] "factor(pais)Singapore"           "factor(pais)Slovakia"
```

```
## [29] "factor(pais)Slovenia"             "factor(pais)Switzerland"
## [31] "factor(pais)United Arab Emirates" "factor(pais)Uruguay"
```

Supuestos

- normalidad

```
# summary(regresion_pais_sp)
shapiro.test(resid(regresion_pais_sp))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  resid(regresion_pais_sp)
## W = 0.96947, p-value = 3.36e-08
```

*homocedasticidad

```
bptest(regresion_pais_sp)
```

```
##
##  studentized Breusch-Pagan test
##
## data:  regresion_pais_sp
## BP = 181.3, df = 98, p-value = 6.423e-07
```

```
dwtest(regresion_pais_sp)
```

```
##
##  Durbin-Watson test
##
## data:  regresion_pais_sp
## DW = 1.7404, p-value = 6.581e-15
## alternative hypothesis: true autocorrelation is greater than 0
```

- multicolinealidad

```
vif(regresion_pais_sp)
```

```
##                  GVIF Df GVIF^(1/(2*Df))
## X            23582889  7        3.362127
## factor(pais) 23582889 91        1.097763
```

By year

- El año en sí mismo no parece tener un efecto significativo en Y después de ajustar por X

```r
regresion_years = lm(Y~X+factor(year))
summary(regresion_years)
```

```
##
## Call:
## lm(formula = Y ~ X + factor(year))
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -6.7085 -1.2173 -0.0302  1.5492  5.9947
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)       20.842962   2.469095   8.442 4.38e-16 ***
## XPIBc              0.013486   0.167092   0.081   0.9357
## XINT              -0.003428   0.010912  -0.314   0.7536
## XDEmp             -0.026372   0.021485  -1.227   0.2203
## XINF               0.006743   0.009473   0.712   0.4769
## XTJ_POB            0.818233   0.095910   8.531 2.25e-16 ***
## XPEA_POB          -3.968402   1.864383  -2.129   0.0338 *
## XMIG_POB         -25.760531  13.893357  -1.854   0.0644 .
## factor(year)2018   0.205572   0.299383   0.687   0.4927
## factor(year)2019   0.477842   0.306280   1.560   0.1194
## factor(year)2020   0.240108   0.316059   0.760   0.4478
## factor(year)2021   0.680640   0.320192   2.126   0.0341 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.021 on 448 degrees of freedom
## Multiple R-squared:  0.3142, Adjusted R-squared:  0.2973
## F-statistic: 18.66 on 11 and 448 DF,  p-value: < 2.2e-16
```

EDA complementario

```r
# Asumiendo que df_panel tiene una columna TJ

#
# df_panel_sum <- df_panel %>%
#   group_by(year) %>%
#   summarise(TG_sum = sum(TG, na.rm = TRUE), TJ_sum = sum(TJ, na.rm = TRUE))
#
# df_panel_sum$year <- as.numeric(as.character(df_panel_sum$year))
#
# df_panel_sum$TJ_norm <- df_panel_sum$TJ_sum / max(df_panel_sum$TJ_sum) * max(df_panel_sum$TG_sum)
#
# ggplot(df_panel_sum, aes(x = year)) +
#   geom_line(aes(y = TG_sum), color = "blue") +
#   geom_point(aes(y = TG_sum), color = "blue") +
#   geom_line(aes(y = TJ_norm), color = "red") +
#   geom_point(aes(y = TJ_norm), color = "red") +
```

```
#   scale_y_continuous(sec.axis = sec_axis(~ . / max(df_panel_sum$TG_sum) * max(df_panel_sum$TJ_sum),
#                                          name = " Log() Total Jugadores")) +
#   labs(x = "Year", y = "Log() Total Ganancias") +
#   theme(legend.position = "top") +
#   theme_classic()
```

```
# Asumiendo que df_panel tiene una columna TJ
# df_sum <- df %>%
#   group_by(year) %>%
#   summarise(TG_sum = sum(TG, na.rm = TRUE), TJ_sum = sum(TJ, na.rm = TRUE))
#
# # df_sum$year <- as.numeric(as.character(df_sum$year))
#
# # Normalizar los datos de TJ para que estén en la misma escala que TG_sum
# df_sum$TJ_norm <- df_sum$TJ_sum / max(df_sum$TJ_sum) * max(df_sum$TG_sum)
#
# ggplot(df_sum, aes(x = year, y = TG_sum, group = 1)) +
#   geom_line(aes(y = TG_sum), color = "blue") +
#   geom_line(aes(y = TJ_norm), color = "red") +
#   scale_y_continuous(sec.axis = sec_axis(~ . / max(df_sum$TG_sum) * max(df_sum$TJ_sum),
#                                          name = "Total Jugadores (TJ)")) +
#   labs(x = "Year", y = "Total Ganacias (TG)") +
#   theme(legend.position = "top") +
#   ggtitle("Ingresos Totales por Año") +
#   theme_economist() +
#   scale_color_economist()
```

```
 # df_panel %>%
 #  group_by(pais) %>%
 #  top_n(5, TG) %>%
 #  arrange(desc(TG))%>%
 #  distinct(pais)
```