# 03 Data Analysis

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# Contents

# Load data

```
# Load PSP data, created in tjbrailey_wrangle_data.Rmd.
psp <- rio::import(paste0(here::here(), "/data/tjbrailey_psp_clean.csv"))
psp <- psp[,-1]

# Load esssential scripts
source(paste0(here::here(), "/R/csts.R"))
source(paste0(here::here(), "/R/lm.R"))
```

# Cross-sectional analyses

## UCDP conflict rates

```
csts("ucdp_cumulative_intensity", "dpi_auton")
```

```
## Joining, by = "country"
```

# Conflict Intensity Value by Percentage of Years Under Segmental Autonomy
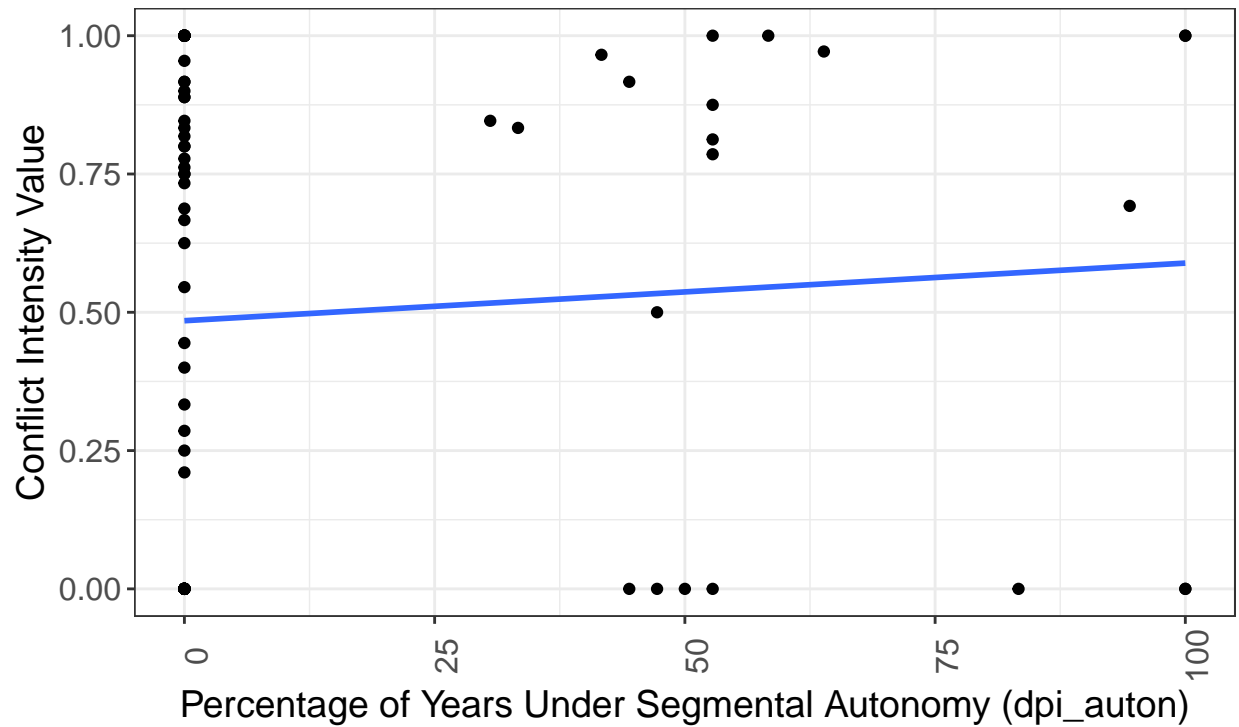


**QOG support/satisfaction with democracy**

```
csts("qog_hum_trust", "dpi_auton")
```

```
## Joining, by = "country"
```

# Social Trust Value by Percentage of Years Under Segmental Autonomy
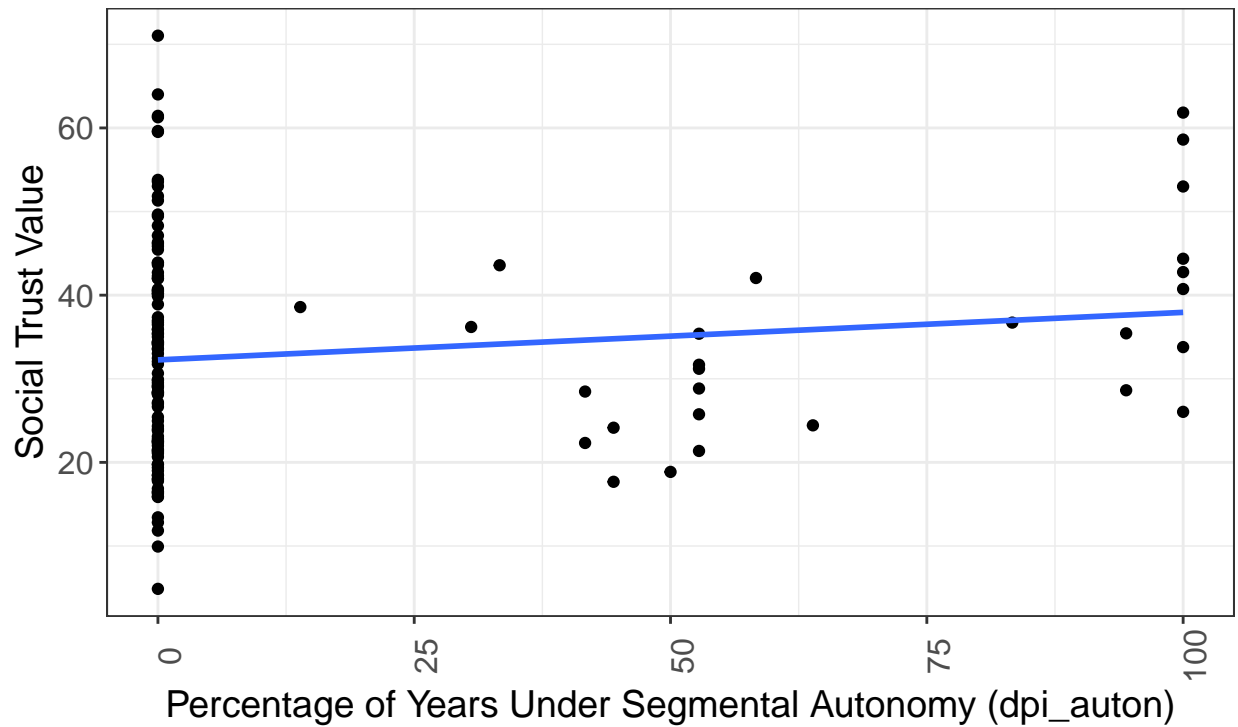


```
csts("qog_hum_supdem", "dpi_auton")
```

```
## Joining, by = "country"
```

# Support for Democracy Value by Percentage of Yea Under Segmental Autonomy



```
csts("qog_hum_satdem", "dpi_auton")
```

```
## Joining, by = "country"
```

# Satisfaction with Democracy Value by Percentage of Years Under Segmental Autonomy



## PolityIV scores

```
csts("polity4_polity_score", "dpi_auton")
```

```
## Joining, by = "country"
```

# Polity Score Value by Percentage of Years Under Segmental Autonomy
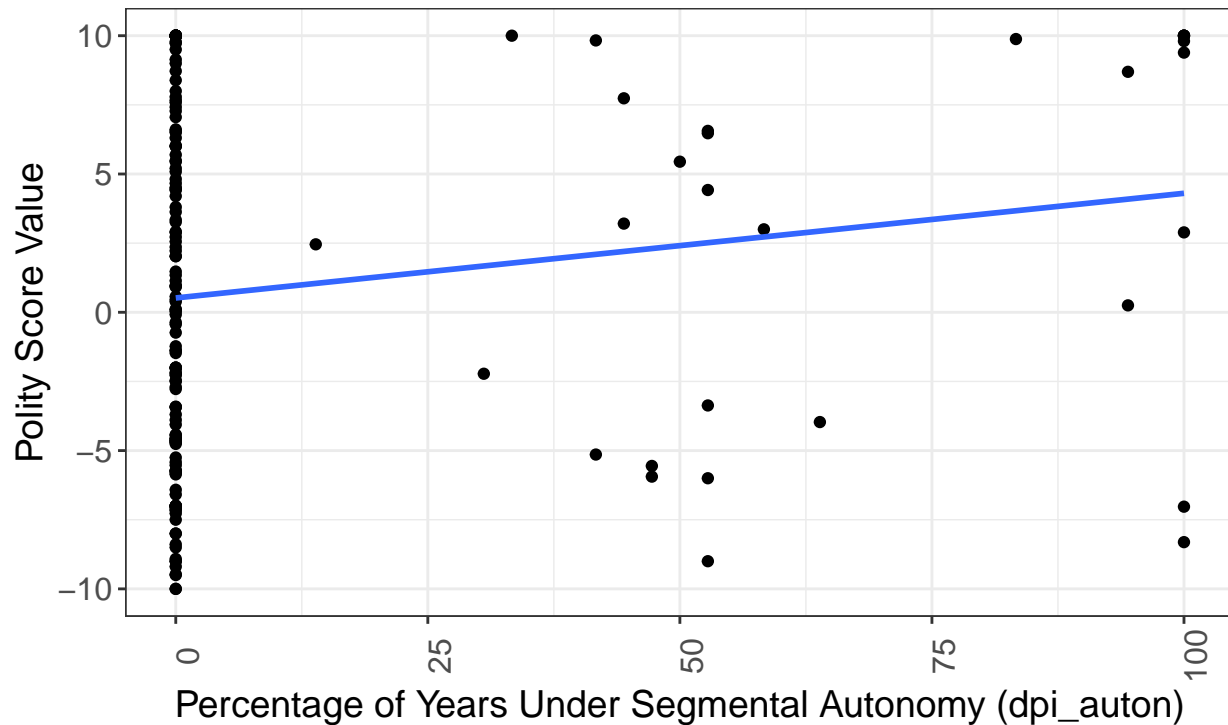


## Linear regressions
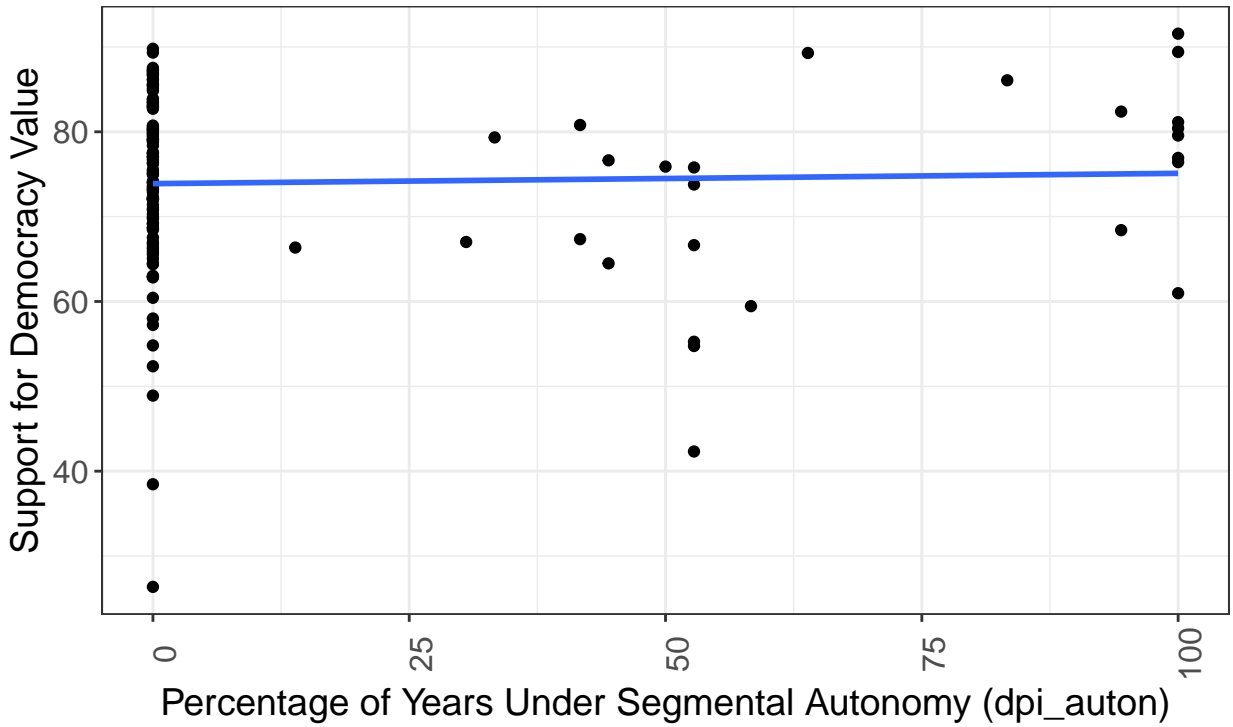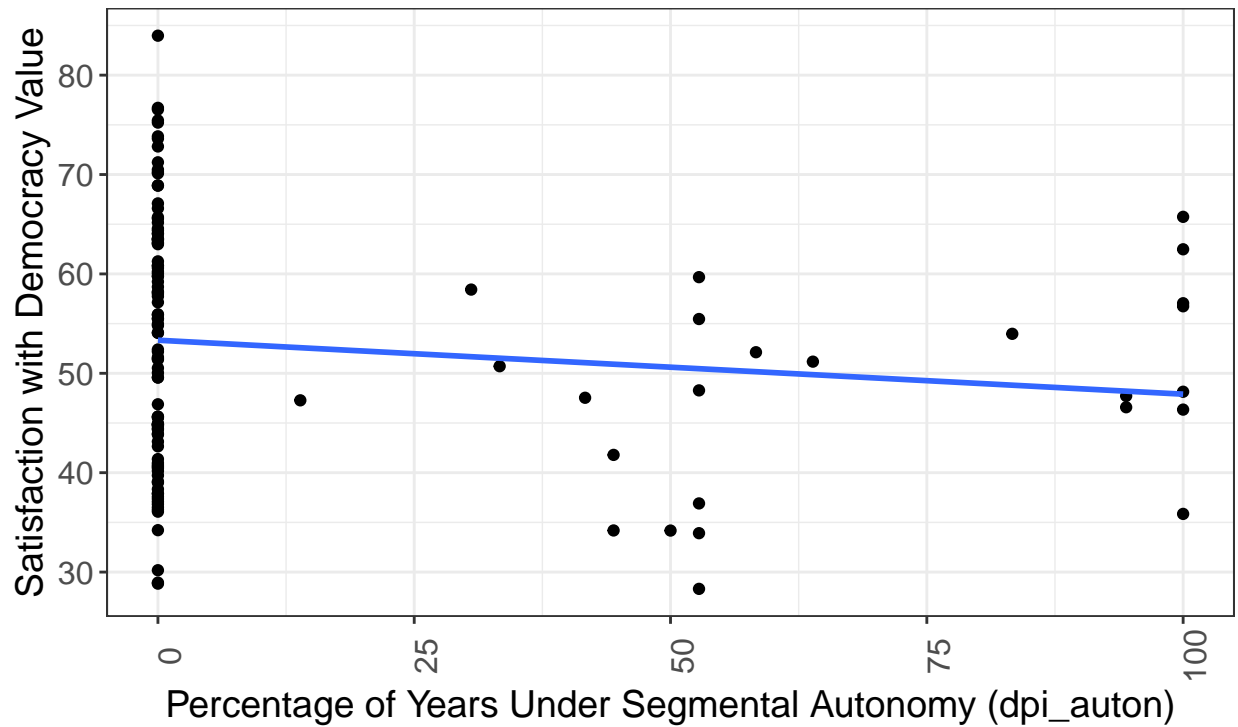
### QOG support/satisfaction with democracy

```
psp_lm("qog_hum_trust", "dpi_auton")
```

```
## 1 coefficient  not defined because the design matrix is rank deficient

## 2 coefficients  not defined because the design matrix is rank deficient

## 1 coefficient  not defined because the design matrix is rank deficient

## 2 coefficients  not defined because the design matrix is rank deficient

##
## \begin{table}
## \begin{center}
## \begin{tabular}{l c c c}
## \hline
##  & Model 1 & Model 2 & Model 3 \\
## \hline
## (Intercept)                  & $49.65^{***}$ & $22.38$    & $22.38$       \\
##                              & $(0.00)$      & $(12.09)$  & $(12.09)$     \\
## dpi\_auton                   & $0.40^{***}$  & $-30.83$   & $-30.83$      \\
##                              & $(0.00)$      & $(23.94)$  & $(23.94)$     \\
## qog\_wbgi\_pve               &               & $4.89$     & $4.89$        \\
##                              &               & $(5.03)$   & $(5.03)$      \\
```

```
## qog\_wdi\_gini                 &              & $0.49$    & $0.49$        \\
##                                &              & $(0.32)$  & $(0.32)$      \\
## qog\_gle\_pop                  &              & $0.00$    & $0.00$        \\
##                                &              & $(0.00)$  & $(0.00)$      \\
## polity4\_polity\_score        &              & $0.77$    & $0.77$        \\
##                                &              & $(0.82)$  & $(0.82)$      \\
## tb\_other\_provis             &              & $-12.28$  & $-12.28$      \\
##                                &              & $(3.39)$  & $(3.39)$      \\
## dpi\_auton:tb\_other\_provis &              &           & $29.00^{*}$ \\
##                                &              &           & $(5.98)$      \\
## \hline
## Country fixed effects          & $Y$          & $Y$       & $Y$           \\
## Year fixed effects             & $N$          & $Y$       & $Y$           \\
## R$^2$                          & $0.51$       & $0.58$    & $0.58$        \\
## Adj. R$^2$                     & $0.47$       & $0.51$    & $0.51$        \\
## Num. obs.                      & $598$        & $409$     & $409$         \\
## RMSE                           & $11.47$      & $11.53$   & $11.53$       \\
## \hline
## \multicolumn{4}{l}{\scriptsize{$^{***}p<0.001$; $^{**}p<0.01$; $^{*}p<0.05$}}
## \end{tabular}
## \caption{Statistical models}
## \label{table:coefficients}
## \end{center}
## \end{table}
psp_lm("qog_hum_trust", "epr_reg_aut_dum")

## 1 coefficient  not defined because the design matrix is rank deficient

## 1 coefficient  not defined because the design matrix is rank deficient

##
## \begin{table}
## \begin{center}
## \begin{tabular}{l c c c}
## \hline
##  & Model 1 & Model 2 & Model 3 \\
## \hline
## (Intercept)                       & $41.56^{**}$ & $22.95$    & $22.95$    \\
##                                   & $(0.36)$     & $(15.02)$  & $(15.02)$ \\
## epr\_reg\_aut\_dum               & $8.09^{*}$   & $-3.26$    & $-32.21$   \\
##                                   & $(0.36)$     & $(8.19)$   & $(26.20)$ \\
## qog\_wbgi\_pve                   &              & $4.71$     & $4.71$     \\
##                                   &              & $(4.94)$   & $(4.94)$   \\
## qog\_wdi\_gini                   &              & $0.48$     & $0.48$     \\
##                                   &              & $(0.32)$   & $(0.32)$   \\
## qog\_gle\_pop                    &              & $0.00$     & $0.00$     \\
##                                   &              & $(0.00)$   & $(0.00)$   \\
## polity4\_polity\_score          &              & $0.67$     & $0.67$     \\
##                                   &              & $(0.79)$   & $(0.79)$   \\
## tb\_other\_provis               &              & $-8.80$    & $-8.80$    \\
##                                   &              & $(4.45)$   & $(4.45)$   \\
## epr\_reg\_aut\_dum:tb\_other\_provis &          &            & $28.95$    \\
##                                   &              &            & $(24.03)$ \\
## \hline
## Country fixed effects             & $Y$          & $Y$        & $Y$        \\
```

```
## Year fixed effects                      & $N$       & $Y$       & $Y$       \\
## R$^2$                                    & $0.52$     & $0.58$     & $0.58$     \\
## Adj. R$^2$                               & $0.48$     & $0.51$     & $0.51$     \\
## Num. obs.                                & $604$      & $415$      & $415$      \\
## RMSE                                     & $11.36$    & $11.48$    & $11.48$    \\
## \hline
## \multicolumn{4}{l}{\scriptsize{$^{***}p<0.001$; $^{**}p<0.01$; $^{*}p<0.05$}}
## \end{tabular}
## \caption{Statistical models}
## \label{table:coefficients}
## \end{center}
## \end{table}
```

```
psp_lm("qog_hum_trust", "rai_n_RAI")
```

```
## 1 coefficient  not defined because the design matrix is rank deficient

## 2 coefficients  not defined because the design matrix is rank deficient

## 1 coefficient  not defined because the design matrix is rank deficient

## 2 coefficients  not defined because the design matrix is rank deficient

##
## \begin{table}
## \begin{center}
## \begin{tabular}{l c c c}
## \hline
##  & Model 1 & Model 2 & Model 3 \\
## \hline
## (Intercept)                 & $-0.36$    & $69.00$    & $78.13^{*}$ \\
##                             & $(19.17)$  & $(28.16)$  & $(23.43)$   \\
## rai\_n\_RAI                 & $1.12$     & $-1.45$    & $-1.88$     \\
##                             & $(0.59)$   & $(0.73)$   & $(0.99)$    \\
## qog\_wbgi\_pve              &           & $2.98$     & $2.98$      \\
##                             &           & $(6.63)$   & $(6.63)$    \\
## qog\_wdi\_gini              &           & $-0.30$    & $-0.30$     \\
##                             &           & $(0.44)$   & $(0.44)$    \\
## qog\_gle\_pop               &           & $-0.00$    & $-0.00$     \\
##                             &           & $(0.00)$   & $(0.00)$    \\
## polity4\_polity\_score      &           & $1.45$     & $1.45$      \\
##                             &           & $(1.37)$   & $(1.37)$    \\
## tb\_other\_provis           &           & $9.14$     &            \\
##                             &           & $(11.89)$  &            \\
## rai\_n\_RAI:tb\_other\_provis &         &           & $0.43$      \\
##                             &           &           & $(0.55)$    \\
## \hline
## Country fixed effects       & $Y$        & $Y$        & $Y$         \\
## Year fixed effects          & $N$        & $Y$        & $Y$         \\
## R$^2$                       & $0.62$     & $0.73$     & $0.73$      \\
## Adj. R$^2$                  & $0.60$     & $0.67$     & $0.67$      \\
## Num. obs.                   & $303$      & $194$      & $194$       \\
## RMSE                        & $10.51$    & $9.85$     & $9.85$      \\
## \hline
## \multicolumn{4}{l}{\scriptsize{$^{***}p<0.001$; $^{**}p<0.01$; $^{*}p<0.05$}}
## \end{tabular}
## \caption{Statistical models}
```

```
## \label{table:coefficients}
## \end{center}
## \end{table}
```

## PolityIV scores

```
# Polity score with DPI measurement of autonomy
psp_lm("polity4_polity_score", "dpi_auton")
```

```
## Warning in model.matrix.default(terms(formula, rhs = 1), data = mf): the
## response appeared on the right-hand side and was dropped

## Warning in model.matrix.default(terms(formula, rhs = 1), data = mf): problem
## with term 7 in model.matrix: no columns are assigned

## Warning in model.matrix.default(terms(formula, rhs = 1), data = mf): the
## response appeared on the right-hand side and was dropped

## Warning in model.matrix.default(terms(formula, rhs = 1), data = mf): problem
## with term 8 in model.matrix: no columns are assigned

## 1 coefficient  not defined because the design matrix is rank deficient

## 2 coefficients  not defined because the design matrix is rank deficient

## 1 coefficient  not defined because the design matrix is rank deficient

## 2 coefficients  not defined because the design matrix is rank deficient

##
## \begin{table}
## \begin{center}
## \begin{tabular}{l c c c}
## \hline
##  & Model 1 & Model 2 & Model 3 \\
## \hline
## (Intercept)                 & $-7.27^{***}$ & $-4.07$  & $-4.07$        \\
##                             & $(0.00)$      & $(2.96)$ & $(2.96)$       \\
## dpi\_auton                  & $2.94$        & $0.24$   & $11.53^{***}$ \\
##                             & $(3.67)$      & $(1.55)$ & $(1.69)$       \\
## qog\_wbgi\_pve              &               & $0.87$   & $0.87$         \\
##                             &               & $(0.65)$ & $(0.65)$       \\
## qog\_wdi\_gini              &               & $0.02$   & $0.02$         \\
##                             &               & $(0.05)$ & $(0.05)$       \\
## qog\_gle\_pop               &               & $0.00$   & $0.00$         \\
##                             &               & $(0.00)$ & $(0.00)$       \\
## tb\_other\_provis           &               & $0.65$   & $0.65$         \\
##                             &               & $(0.77)$ & $(0.77)$       \\
## dpi\_auton:tb\_other\_provis &             &          & $-6.20^{*}$    \\
##                             &               &          & $(2.67)$       \\
## \hline
## Country fixed effects       & $Y$           & $Y$      & $Y$            \\
## Year fixed effects          & $N$           & $Y$      & $Y$            \\
## R$^2$                       & $0.64$        & $0.82$   & $0.82$         \\
## Adj. R$^2$                  & $0.63$        & $0.79$   & $0.79$         \\
## Num. obs.                   & $2379$        & $758$    & $758$          \\
## RMSE                        & $4.27$        & $2.35$   & $2.35$         \\
## \hline
```

```
## \multicolumn{4}{l}{\scriptsize{$^{***}p<0.001$; $^{**}p<0.01$; $^{*}p<0.05$}}
## \end{tabular}
## \caption{Statistical models}
## \label{table:coefficients}
## \end{center}
## \end{table}
```

```r
# Free and fair elections (robustness checks)
psp_lm("v2elfrfair", "dpi_auton")
```

```
## 1 coefficient  not defined because the design matrix is rank deficient
##
## 2 coefficients  not defined because the design matrix is rank deficient

## 1 coefficient  not defined because the design matrix is rank deficient

## 2 coefficients  not defined because the design matrix is rank deficient

##
## \begin{table}
## \begin{center}
## \begin{tabular}{l c c c}
## \hline
##  & Model 1 & Model 2 & Model 3 \\
## \hline
## (Intercept)                    & $-1.39^{***}$ & $-0.64$     & $-0.64$         \\
##                                & $(0.00)$      & $(0.64)$    & $(0.64)$        \\
## dpi\_auton                     & $0.04$        & $-0.50$     & $1.80^{***}$ \\
##                                & $(1.56)$      & $(0.33)$    & $(0.36)$        \\
## qog\_wbgi\_pve                 &               & $0.04$      & $0.04$          \\
##                                &               & $(0.08)$    & $(0.08)$        \\
## qog\_wdi\_gini                 &               & $0.00$      & $0.00$          \\
##                                &               & $(0.01)$    & $(0.01)$        \\
## qog\_gle\_pop                  &               & $-0.00$     & $-0.00$         \\
##                                &               & $(0.00)$    & $(0.00)$        \\
## polity4\_polity\_score         &               & $0.05^{**}$ & $0.05^{**}$ \\
##                                &               & $(0.01)$    & $(0.01)$        \\
## tb\_other\_provis              &               & $0.41^{*}$  & $0.41^{*}$  \\
##                                &               & $(0.15)$    & $(0.15)$        \\
## dpi\_auton:tb\_other\_provis   &               &             & $-0.22$         \\
##                                &               &             & $(0.29)$        \\
## \hline
## Country fixed effects          & $Y$           & $Y$         & $Y$             \\
## Year fixed effects             & $N$           & $Y$         & $Y$             \\
## R$^2$                          & $0.69$        & $0.92$      & $0.92$          \\
## Adj. R$^2$                     & $0.68$        & $0.91$      & $0.91$          \\
## Num. obs.                      & $2111$        & $753$       & $753$           \\
## RMSE                           & $0.81$        & $0.36$      & $0.36$          \\
## \hline
## \multicolumn{4}{l}{\scriptsize{$^{***}p<0.001$; $^{**}p<0.01$; $^{*}p<0.05$}}
## \end{tabular}
## \caption{Statistical models}
## \label{table:coefficients}
## \end{center}
## \end{table}
```

```r
# Polity score with different measurements of regional autonomy (robustness checks)
psp_lm("polity4_polity_score", "epr_reg_aut_dum")
```

```
## Warning in model.matrix.default(terms(formula, rhs = 1), data = mf): the
## response appeared on the right-hand side and was dropped

## Warning in model.matrix.default(terms(formula, rhs = 1), data = mf): problem
## with term 7 in model.matrix: no columns are assigned

## Warning in model.matrix.default(terms(formula, rhs = 1), data = mf): the
## response appeared on the right-hand side and was dropped

## Warning in model.matrix.default(terms(formula, rhs = 1), data = mf): problem
## with term 8 in model.matrix: no columns are assigned

##
## \begin{table}
## \begin{center}
## \begin{tabular}{l c c c}
## \hline
##  & Model 1 & Model 2 & Model 3 \\
## \hline
## (Intercept)                      & $-9.30^{***}$ & $-4.04$  & $-4.23$  \\
##                                  & $(1.16)$      & $(2.82)$ & $(2.86)$ \\
## epr\_reg\_aut\_dum               & $2.79$        & $-1.24$  & $-0.25$  \\
##                                  & $(1.60)$      & $(1.41)$ & $(0.68)$ \\
## qog\_wbgi\_pve                   &               & $0.70$   & $0.71$   \\
##                                  &               & $(0.65)$ & $(0.65)$ \\
## qog\_wdi\_gini                   &               & $0.02$   & $0.02$   \\
##                                  &               & $(0.05)$ & $(0.05)$ \\
## qog\_gle\_pop                    &               & $0.00$   & $0.00$   \\
##                                  &               & $(0.00)$ & $(0.00)$ \\
## tb\_other\_provis                &               & $0.07$   & $0.07$   \\
##                                  &               & $(0.70)$ & $(0.70)$ \\
## epr\_reg\_aut\_dum:tb\_other\_provis &           &          & $-1.55$  \\
##                                  &               &          & $(2.11)$ \\
## \hline
## Country fixed effects            & $Y$           & $Y$      & $Y$      \\
## Year fixed effects               & $N$           & $Y$      & $Y$      \\
## R$^2$                            & $0.64$        & $0.81$   & $0.81$   \\
## Adj. R$^2$                       & $0.63$        & $0.79$   & $0.79$   \\
## Num. obs.                        & $2410$        & $773$    & $773$    \\
## RMSE                             & $4.25$        & $2.38$   & $2.38$   \\
## \hline
## \multicolumn{4}{l}{\scriptsize{$^{***}p<0.001$; $^{**}p<0.01$; $^{*}p<0.05$}}
## \end{tabular}
## \caption{Statistical models}
## \label{table:coefficients}
## \end{center}
## \end{table}
```

```r
psp_lm("polity4_polity_score", "rai_n_RAI")
```

```
## Warning in model.matrix.default(terms(formula, rhs = 1), data = mf): the
## response appeared on the right-hand side and was dropped

## Warning in model.matrix.default(terms(formula, rhs = 1), data = mf): problem
```

```
## with term 7 in model.matrix: no columns are assigned

## Warning in model.matrix.default(terms(formula, rhs = 1), data = mf): the
## response appeared on the right-hand side and was dropped

## Warning in model.matrix.default(terms(formula, rhs = 1), data = mf): problem
## with term 8 in model.matrix: no columns are assigned

## 1 coefficient  not defined because the design matrix is rank deficient

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##
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##
## 1 coefficient  not defined because the design matrix is rank deficient

##
## \begin{table}
## \begin{center}
## \begin{tabular}{l c c c}
## \hline
##  & Model 1 & Model 2 & Model 3 \\
## \hline
## (Intercept)                 & $-22.59^{**}$ &            &             \\
##                             & $(4.69)$      &            &             \\
## rai\_n\_RAI                 & $1.03^{**}$   & $0.41$   & $-8.19$   \\
##                             & $(0.15)$      & $(0.29)$ & $(8.35)$ \\
## qog\_wbgi\_pve              &               & $0.36$   & $0.33$   \\
##                             &               & $(0.46)$ & $(0.48)$ \\
## qog\_wdi\_gini              &               & $-0.06$  & $-0.06$  \\
##                             &               & $(0.07)$ & $(0.07)$ \\
## qog\_gle\_pop               &               & $0.00$   & $0.00$   \\
##                             &               & $(0.00)$ & $(0.00)$ \\
## tb\_other\_provis           &               & $-3.83$  & $-3.94$  \\
##                             &               & $(8.34)$ & $(8.35)$ \\
## rai\_n\_RAI:tb\_other\_provis &             &          & $8.60$   \\
##                             &               &          & $(8.25)$ \\
## \hline
## Country fixed effects       & $Y$           & $Y$      & $Y$         \\
## Year fixed effects          & $N$           & $Y$      & $Y$         \\
## R$^2$                       & $0.66$        & $0.77$   & $0.77$   \\
## Adj. R$^2$                  & $0.65$        & $0.73$   & $0.73$   \\
## Num. obs.                   & $594$         & $221$    & $221$       \\
## RMSE                        & $3.11$        & $1.03$   & $1.03$   \\
## \hline
## \multicolumn{4}{l}{\scriptsize{$^{***}p<0.001$; $^{**}p<0.01$; $^{*}p<0.05$}}
## \end{tabular}
## \caption{Statistical models}
## \label{table:coefficients}
## \end{center}
## \end{table}
```

# Cox regressions

```
# DPI
cox1 <- survival::coxph(survival::Surv(year, ucdp_cumulative_intensity) ~ (dpi_auton * tb_other_provis)
#summary(cox1)
#reporttools::displayCoxPH(cox1)

# EPR
cox2 <- survival::coxph(survival::Surv(year, ucdp_cumulative_intensity) ~ (epr_reg_aut_dum * tb_other_pr

## Warning in fitter(X, Y, istrat, offset, init, control, weights = weights, :
## Loglik converged before variable 13,32,35,50,62,68,102,104,106,118,119,123,172 ;
## coefficient may be infinite.

#summary(cox2)
#reporttools::displayCoxPH(cox2)

# RAI
cox3 <- survival::coxph(survival::Surv(year, ucdp_cumulative_intensity) ~ (rai_n_RAI * tb_other_provis)

## Warning in fitter(X, Y, istrat, offset, init, control, weights = weights, :
## Loglik converged before variable 1,2,106,159,189 ; coefficient may be infinite.

#summary(cox3)
#reporttools::displayCoxPH(cox3)
```

## Multivariate comparison across operationalizations

```
psp <- psp %>%
    dplyr::mutate_if(is.numeric, round, digits = 3) %>%
    dplyr::filter(qog_fe_etfra > median(psp$qog_fe_etfra, na.rm = TRUE))

dpi_reg <- estimatr::lm_robust(polity4_polity_score ~ (dpi_auton * tb_other_provis) + as.factor(country)

epr_reg <- estimatr::lm_robust(polity4_polity_score ~ (epr_reg_aut_dum * tb_other_provis) + as.factor(co

rai_reg <- estimatr::lm_robust(polity4_polity_score ~ (rai_n_RAI * tb_other_provis) + as.factor(country)

tex_fin <- texreg::texreg(list(dpi_reg, epr_reg, rai_reg), mfrow = TRUE,
                                    omit.coef = "as.factor",
                                    include.ci = FALSE,
                                    custom.gof.rows = list(`Country fixed effects` = c("Y", "Y", "Y"),
                                                            `Year fixed effects` = c("Y", "Y", "Y")))
```

```
## 2 coefficients  not defined because the design matrix is rank deficient
```

```
## 1 coefficient  not defined because the design matrix is rank deficient
```

```
tex_fin
```

```
##
## \begin{table}
## \begin{center}
## \begin{tabular}{l c c c}
## \hline
##  & Model 1 & Model 2 & Model 3 \\
## \hline
```

```
## (Intercept)                            & $-4.07$      & $-4.23$  &           \\
##                                        & $(2.96)$     & $(2.86)$ &           \\
## dpi\_auton                             & $11.53^{***}$ &         &           \\
##                                        & $(1.69)$     &          &           \\
## tb\_other\_provis                      & $0.65$       & $0.07$   & $-3.94$   \\
##                                        & $(0.77)$     & $(0.70)$ & $(8.35)$  \\
## qog\_wbgi\_pve                         & $0.87$       & $0.71$   & $0.33$    \\
##                                        & $(0.65)$     & $(0.65)$ & $(0.48)$  \\
## qog\_wdi\_gini                         & $0.02$       & $0.02$   & $-0.06$   \\
##                                        & $(0.05)$     & $(0.05)$ & $(0.07)$  \\
## qog\_gle\_pop                          & $0.00$       & $0.00$   & $0.00$    \\
##                                        & $(0.00)$     & $(0.00)$ & $(0.00)$  \\
## dpi\_auton:tb\_other\_provis          & $-6.20^{*}$  &          &           \\
##                                        & $(2.67)$     &          &           \\
## epr\_reg\_aut\_dum                     &              & $-0.25$  &           \\
##                                        &              & $(0.68)$ &           \\
## epr\_reg\_aut\_dum:tb\_other\_provis  &              & $-1.55$  &           \\
##                                        &              & $(2.11)$ &           \\
## rai\_n\_RAI                            &              &          & $-8.19$   \\
##                                        &              &          & $(8.35)$  \\
## rai\_n\_RAI:tb\_other\_provis         &              &          & $8.60$    \\
##                                        &              &          & $(8.25)$  \\
## \hline
## Country fixed effects                  & $Y$          & $Y$      & $Y$       \\
## Year fixed effects                     & $Y$          & $Y$      & $Y$       \\
## R$^2$                                  & $0.82$       & $0.81$   & $0.77$    \\
## Adj. R$^2$                             & $0.79$       & $0.79$   & $0.73$    \\
## Num. obs.                              & $758$        & $773$    & $221$     \\
## RMSE                                   & $2.35$       & $2.38$   & $1.03$    \\
## \hline
## \multicolumn{4}{l}{\scriptsize{$^{***}p<0.001$; $^{**}p<0.01$; $^{*}p<0.05$}}
## \end{tabular}
## \caption{Statistical models}
## \label{table:coefficients}
## \end{center}
## \end{table}
```