Code for Master's Thesis Analysis Julia Ebben

2025-11-20

```
library(readxl)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(stargazer)
```

```
##
## Please cite as:

##  Hlavac, Marek (2022). stargazer: Well-Formatted Regression and Summary Statistics Tables.

##  R package version 5.2.3. https://CRAN.R-project.org/package=stargazer
```

```
library(car)
```

```
## Loading required package: carData

##
## Attaching package: 'car'

## The following object is masked from 'package:dplyr':
##
##     recode
```

```
library(fixest)
library(modelsummary)
library(clubSandwich)
```

```
## Registered S3 method overwritten by 'clubSandwich':
##   method    from
##   bread.mlm sandwich
```

```r
library(plm)
```

```
## Warning: package 'plm' was built under R version 4.5.2
```

```
##
## Attaching package: 'plm'
```

```
## The following objects are masked from 'package:dplyr':
##
##     between, lag, lead
```

```r
library(e1071)
```

```
## Warning: package 'e1071' was built under R version 4.5.2
```

Call in Data

```r
df1 <- read_excel("cosine_summary.xlsx") %>%
  filter(OVERUNIT_ID != "NI12")

df2 <- read_excel("DATAFRAME.xlsx")

df3 <- read_excel("pair_deltas.xlsx")

merged_df12 <- merge(df1, df2, by = "OVERUNIT_ID", all = TRUE)

merged_df <- merge(
  merged_df12, df3,
  by = "pair_relative_path",
  all = TRUE
)

merged_df <- merged_df %>% filter(OVERUNIT_ID != "NI12")
if (interactive()) View(merged_df)

#write.xlsx(merged_df, "merged_all_three.xlsx")
```

Table export helper

Looking at the mean and variance of cosine_similarity mean = 0.9159404 variance = 0.01602832

```r
mean(merged_df$cosine_similarity, na.rm=TRUE)
```

```
## [1] 0.9159404
```

```r
var(merged_df$cosine_similarity, na.rm=TRUE)
```

```
## [1] 0.01602832
```

```r
sd(merged_df$cosine_similarity, na.rm=TRUE)
```

```
## [1] 0.126603
```

Looking at the mean and variance of PROP_WOM mean = 0.3178416 variance = 0.02937136

```r
mean(merged_df$PROP_WOM, na.rm=TRUE)
```

```
## [1] 0.3178416
```

```r
var(merged_df$PROP_WOM, na.rm=TRUE)
```

```
## [1] 0.02937136
```

```r
sd(merged_df$PROP_WOM, na.rm=TRUE)
```

```
## [1] 0.1713808
```

Looking at the mean and variance of delta_total_dict_matches mean = 0.1276316 variance = 1.06801 Really small mean -> very few entries have any change in total dictionary matches

```r
mean(merged_df$delta_total_dict_matches, na.rm=TRUE)
```

```
## [1] 0.1276316
```

```r
var(merged_df$delta_total_dict_matches, na.rm=TRUE)
```

```
## [1] 1.06801
```

```r
sd(merged_df$delta_total_dict_matches, na.rm=TRUE)
```

```
## [1] 1.033446
```

This test looks at the skewness of delta_total_dict_matches and the zero counts 83.8%, or 637 of the 760 observations are zero

```r
x <- merged_df$delta_total_dict_matches
n_rows    <- nrow(merged_df)
n_nonmiss <- sum(!is.na(x))
n_zero    <- sum(x == 0, na.rm = TRUE)
skew_val  <- e1071::skewness(x, na.rm = TRUE, type = 2)  # bias-corrected

cat(sprintf(
  "Total rows: %d\nNon-missing: %d\nZeros: %d (%.1f%% of non-missing, %.1f%% of all rows)\nSkewness (ty
  n_rows, n_nonmiss, n_zero, 100 * n_zero / n_nonmiss, 100 * n_zero / n_rows, skew_val
))
```

```
## Total rows: 760
## Non-missing: 760
## Zeros: 637 (83.8% of non-missing, 83.8% of all rows)
## Skewness (type 2): 1.437
```

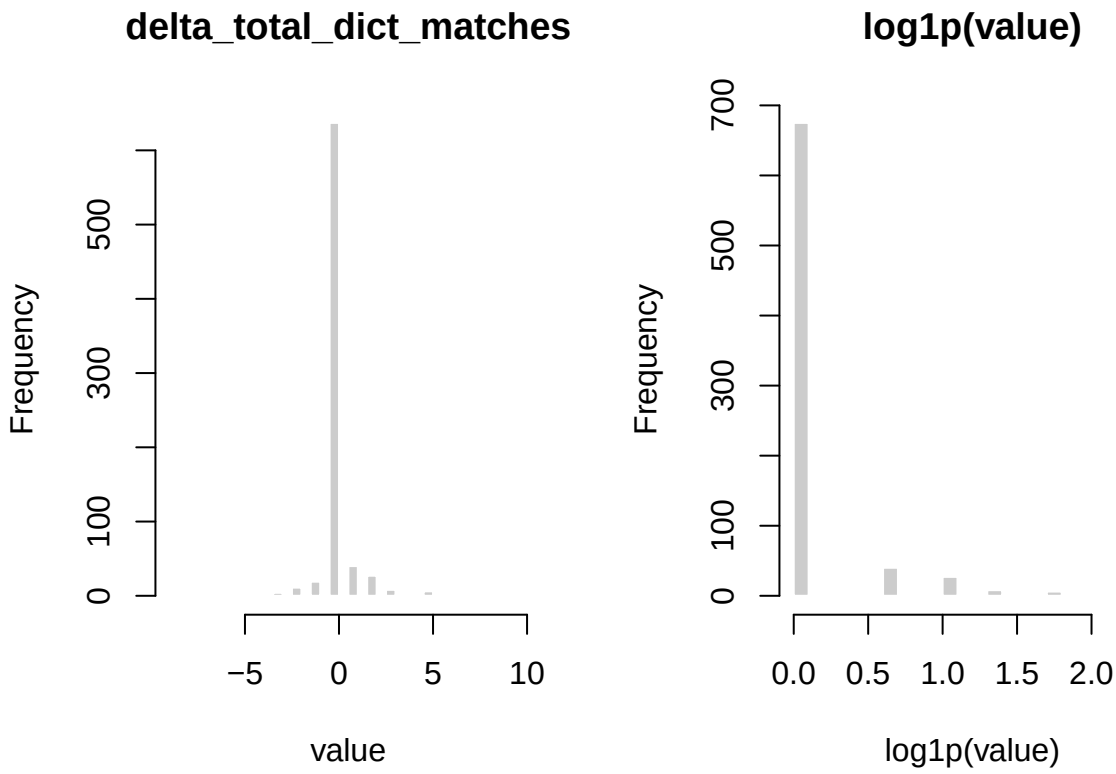
```r
# Summary and quantiles
print(summary(x))
```

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -9.0000  0.0000  0.0000  0.1276  0.0000 10.0000
```

```r
print(round(quantile(x, probs = c(.01,.05,.10,.25,.5,.75,.90,.95,.99), na.rm = TRUE), 3))
```

```
##    1%    5%   10%   25%   50%   75%   90%   95%   99%
## -2.41 -0.05  0.00  0.00  0.00  0.00  1.00  2.00  4.41
```

```r
# Plots: raw and log1p to visualize right tail with many zeros
op <- par(mfrow = c(1, 2))
hist(x, breaks = 30, main = "delta_total_dict_matches", xlab = "value", col = "gray80", border = "white
hist(log1p(pmax(x, 0)), breaks = 30, main = "log1p(value)", xlab = "log1p(value)", col = "gray80", borde
```




```r
par(op)
```

Creating a visual for the distribution of delta_total_dict_matches

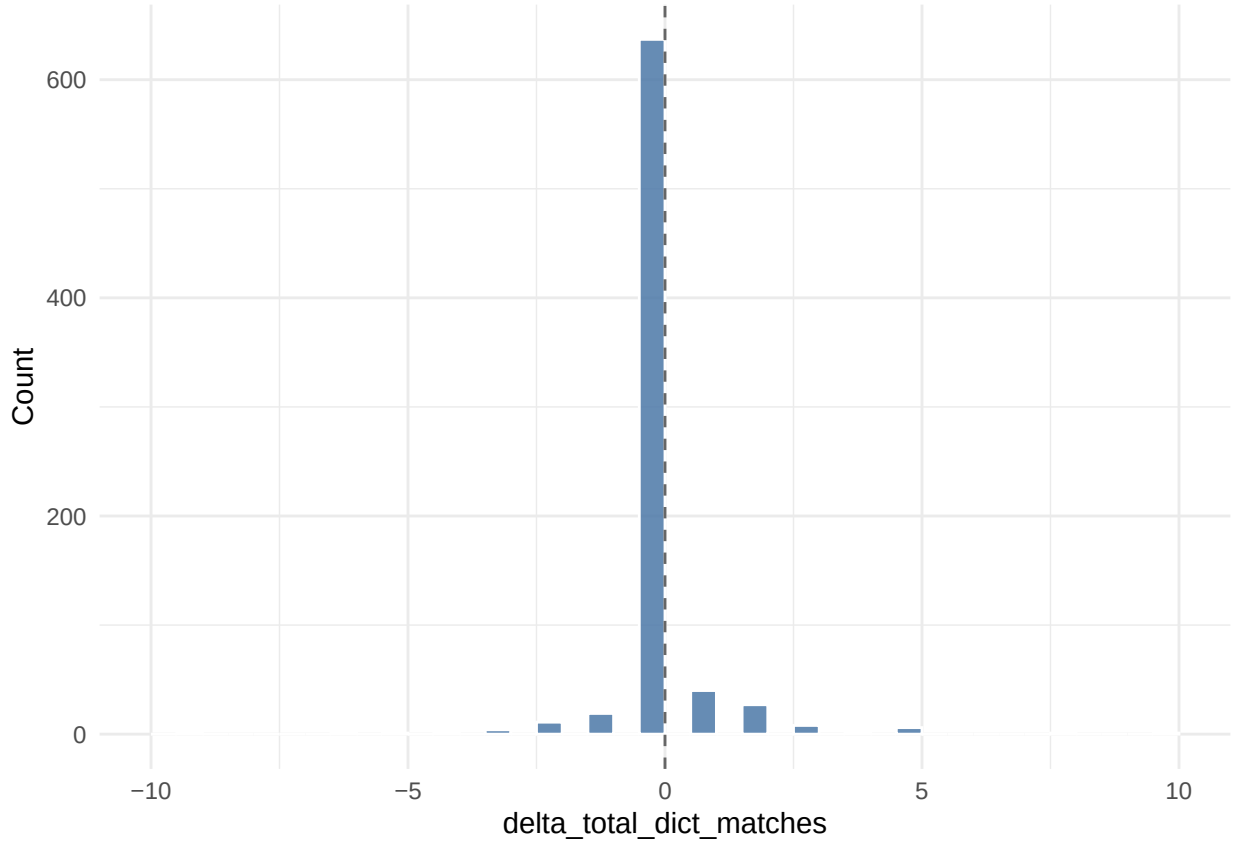
```r
suppressPackageStartupMessages({
  library(ggplot2)
  if (!requireNamespace("e1071", quietly = TRUE)) install.packages("e1071")
})
```

```
## Warning: package 'ggplot2' was built under R version 4.5.2
```

```r
# Data and summary
df_delta <- na.omit(data.frame(x = merged_df$delta_total_dict_matches))
n_rows    <- nrow(merged_df)
n_nonmiss <- nrow(df_delta)
n_zero    <- sum(df_delta$x == 0)
skew_val  <- e1071::skewness(df_delta$x, na.rm = TRUE, type = 2)

cat(sprintf(
  "Total rows: %d\nNon-missing: %d\nZeros: %d (%.1f%% of non-missing, %.1f%% of all rows)\nSkewness (ty
  n_rows, n_nonmiss, n_zero, 100 * n_zero / n_nonmiss, 100 * n_zero / n_rows, skew_val
))
```

```
## Total rows: 760
## Non-missing: 760
## Zeros: 637 (83.8% of non-missing, 83.8% of all rows)
## Skewness (type 2): 1.437
```

```r
# Nice-looking histogram with density overlay
# Binwidth via Freedman-Diaconis (fallback to 0.5 if IQR is 0)
bw_fd <- tryCatch(2 * IQR(df_delta$x) / (n_nonmiss)^(1/3), error = function(e) NA_real_)
if (!is.finite(bw_fd) || bw_fd <= 0) bw_fd <- 0.5

x_max <- max(df_delta$x, na.rm = TRUE)
x_max_break <- ceiling(x_max / 5) * 5  # round up to nearest 5 for clean ticks

p_counts <- ggplot(df_delta, aes(x)) +
  geom_histogram(aes(y = after_stat(count)),
                 binwidth = bw_fd, boundary = 0, closed = "right",
                 fill = "#4C78A8", color = "white", alpha = 0.85) +
  geom_vline(xintercept = 0, linetype = 2, color = "gray40") +
  scale_x_continuous(name = "delta_total_dict_matches",
                     breaks = seq(-10, x_max_break, by = 5),
                     limits = c(-10, x_max_break)) +
  ylab("Count") + theme_minimal()
print(p_counts)
```




```
# Save for paper (PNG + PDF)
fig_dir <- file.path(getwd(), "figures")
dir.create(fig_dir, showWarnings = FALSE, recursive = TRUE)
ggsave(file.path(fig_dir, "delta_total_dict_matches_hist.png"), p_counts, width = 7, height = 5, dpi = 3
ggsave(file.path(fig_dir, "delta_total_dict_matches_hist.pdf"), p_counts, width = 7, height = 5, units =

cat("Saved to:\n", normalizePath(fig_dir, winslash = "\\"), "\n")
```

```
## Saved to:
##  \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\figures
```

Checking proportions of LR_DUMMY and AMENDMENT_DUMMY 17% of bill-law pairs are not introduced by the LR 52% of bill-law pairs are amendments(/updates to existing laws)

```
suppressPackageStartupMessages(library(dplyr))

props_01 <- function(df, vars) {
  dplyr::bind_rows(lapply(vars, function(v) {
    x <- suppressWarnings(as.numeric(as.character(df[[v]])))
    n_nonmiss <- sum(!is.na(x))
    ones  <- sum(x == 1, na.rm = TRUE)
    zeros <- sum(x == 0, na.rm = TRUE)
    tibble::tibble(
      variable  = v,
      n_nonmiss = n_nonmiss,
```

```
      missing   = sum(is.na(x)),
      zeros     = zeros,
      ones      = ones,
      prop0     = ifelse(n_nonmiss > 0, zeros / n_nonmiss, NA_real_),
      prop1     = ifelse(n_nonmiss > 0, ones  / n_nonmiss, NA_real_)
    )
  }))
}

res <- props_01(merged_df, c("AMENDMENT_DUMMY","LR_DUMMY")) %>%
  mutate(across(c(prop0, prop1), ~ round(.x, 3)))

print(res, n = Inf, width = Inf)
```

```
## # A tibble: 2 x 7
##   variable        n_nonmiss missing zeros  ones prop0 prop1
##   <chr>               <int>   <int> <int> <int> <dbl> <dbl>
## 1 AMENDMENT_DUMMY       760       0   368   392 0.484 0.516
## 2 LR_DUMMY              760       0   128   632 0.168 0.832
```

This fixed effects diagnostics test affirms that there is still variation when state fixed effects are added

```
merged_df <- merged_df %>%
  mutate(state_code = substr(as.character(OVERUNIT_ID), 1, 2))

# quick checks
cat("States found (counts):\n"); print(sort(table(merged_df$state_code)))
```

```
## States found (counts):

##
##  BE  TH  HH  SL  SN  RP  NI  ST  BW  BB  NW  HE  MV  SH  BY
##  16  27  34  41  41  43  46  46  48  52  52  57  59  86 112
```

```
cat("Number of distinct states:", dplyr::n_distinct(merged_df$state_code), "\n")
```

```
## Number of distinct states: 15
```

```
# define predictors to test
predictors <- c(
  "PROP_WOM", "LR_DUMMY", "AMENDMENT_DUMMY", "CHAIR_WOM_DUMMY", "MINISTER_WOM_DUMMY",
  "MINISTER_GRÜNE_DUMMY", "COMM_CHAIR_GRÜNE_DUMMY", "AVG_AGE_START", "AVG_EDU", "AVG_OCCEXP_BROAD_UMWEL
  "ALIGN_CHAIR_MINISTER", "PROP_WOM_IN_PARL"
)
predictors <- predictors[predictors %in% names(merged_df)]

# compute whether each predictor has any within-state variation
no_within_state <- sapply(predictors, function(v) {
  x <- merged_df[[v]]
  if (all(is.na(x))) return(TRUE)
  dd <- merged_df %>% group_by(state_code) %>% summarize(n = n_distinct(.data[[v]], na.rm = TRUE)) %>% p
```

```
  all(dd <= 1, na.rm = TRUE)
})

diag_state_tbl <- data.frame(
  variable = predictors,
  no_within_state_variation = as.logical(no_within_state),
  stringsAsFactors = FALSE
) %>% arrange(no_within_state_variation)

print(diag_state_tbl)
```

```
##                   variable no_within_state_variation
## 1                 PROP_WOM                      FALSE
## 2                 LR_DUMMY                      FALSE
## 3          AMENDMENT_DUMMY                      FALSE
## 4          CHAIR_WOM_DUMMY                      FALSE
## 5       MINISTER_WOM_DUMMY                      FALSE
## 6     MINISTER_GRÜNE_DUMMY                      FALSE
## 7   COMM_CHAIR_GRÜNE_DUMMY                      FALSE
## 8             AVG_AGE_START                      FALSE
## 9                   AVG_EDU                      FALSE
## 10 AVG_OCCEXP_BROAD_UMWELT                      FALSE
## 11    ALIGN_CHAIR_MINISTER                      FALSE
## 12        PROP_WOM_IN_PARL                      FALSE
```

```
cat("\nVariables WITH within-state variation (can be identified by state FE):\n")
```

```
##
## Variables WITH within-state variation (can be identified by state FE):
```

```
print(diag_state_tbl$variable[!diag_state_tbl$no_within_state_variation])
```

```
##  [1] "PROP_WOM"                "LR_DUMMY"
##  [3] "AMENDMENT_DUMMY"         "CHAIR_WOM_DUMMY"
##  [5] "MINISTER_WOM_DUMMY"      "MINISTER_GRÜNE_DUMMY"
##  [7] "COMM_CHAIR_GRÜNE_DUMMY"  "AVG_AGE_START"
##  [9] "AVG_EDU"                 "AVG_OCCEXP_BROAD_UMWELT"
## [11] "ALIGN_CHAIR_MINISTER"    "PROP_WOM_IN_PARL"
```

```
cat("\nVariables WITHOUT within-state variation (will be absorbed by state FE):\n")
```

```
##
## Variables WITHOUT within-state variation (will be absorbed by state FE):
```

```
print(diag_state_tbl$variable[diag_state_tbl$no_within_state_variation])
```

```
## character(0)
```

Amount of variance in predictors explained by state fixed effects The largest between_share variance for any variable is 0.586 (PROP_WOM_IN_PARL) PROP_WOM's between_variance is 0.416 CHAIR_WOM_DUMMY's between_variance is 0.256

```r
suppressPackageStartupMessages(library(dplyr))

if (!"state_code" %in% names(merged_df) && "OVERUNIT_ID" %in% names(merged_df)) {
  merged_df <- merged_df %>% dplyr::mutate(state_code = substr(as.character(OVERUNIT_ID), 1, 2))
}

preds <- c(
  "PROP_WOM","LR_DUMMY","AMENDMENT_DUMMY","CHAIR_WOM_DUMMY","MINISTER_WOM_DUMMY",
  "MINISTER_GRÜNE_DUMMY","COMM_CHAIR_GRÜNE_DUMMY","AVG_AGE_START","AVG_EDU",
  "AVG_OCCEXP_BROAD_UMWELT","ALIGN_CHAIR_MINISTER","PROP_WOM_IN_PARL","delta_total_dict_matches","cosine
)
preds <- intersect(preds, names(merged_df))

decomp_one <- function(df, var) {
  df2 <- df %>%
    dplyr::select(state_code, dplyr::all_of(var)) %>%
    dplyr::filter(!is.na(state_code), !is.na(.data[[var]]))
  x <- df2[[var]]
  if (length(x) < 2) {
    return(tibble::tibble(
      variable = var, N = length(x),
      total_var = NA_real_, between_var = NA_real_, within_var = NA_real_,
      between_share = NA_real_, within_share = NA_real_, R2_stateFE = NA_real_
    ))
  }
  N <- nrow(df2)
  overall <- mean(x)
  grp <- df2 %>%
    dplyr::group_by(state_code) %>%
    dplyr::summarize(n = dplyr::n(), mean = mean(.data[[var]]), .groups = "drop")
  between_var <- sum(grp$n * (grp$mean - overall)^2) / (N - 1)
  total_var   <- stats::var(x)
  within_var  <- total_var - between_var
  R2 <- tryCatch(summary(lm(x ~ factor(df2$state_code)))$r.squared, error = function(e) NA_real_)
  tibble::tibble(
    variable = var, N = N,
    total_var = total_var,
    between_var = between_var,
    within_var = within_var,
    between_share = between_var / total_var,
    within_share = within_var / total_var,
    R2_stateFE = R2
  )
}

res <- dplyr::bind_rows(lapply(preds, function(v) decomp_one(merged_df, v))) %>%
  dplyr::arrange(dplyr::desc(between_share))

print(res, n = Inf, width = Inf)
```

```
## # A tibble: 14 x 8
##    variable                     N total_var between_var within_var between_share
##    <chr>                    <int>     <dbl>       <dbl>      <dbl>         <dbl>
```

```
##  1 PROP_WOM_IN_PARL           760   0.00657     0.00385    0.00272        0.586
##  2 AVG_EDU                    760   0.165       0.0847     0.0802         0.514
##  3 PROP_WOM                   760   0.0294      0.0122     0.0172         0.416
##  4 AVG_AGE_START              760   9.43        3.77       5.66           0.399
##  5 MINISTER_WOM_DUMMY         760   0.212       0.0787     0.134          0.371
##  6 AVG_OCCEXP_BROAD_UMWELT    760   0.00679     0.00204    0.00475        0.300
##  7 MINISTER_GRÜNE_DUMMY       760   0.152       0.0448     0.107          0.294
##  8 ALIGN_CHAIR_MINISTER       760   0.234       0.0609     0.173          0.261
##  9 CHAIR_WOM_DUMMY            760   0.147       0.0377     0.109          0.256
## 10 COMM_CHAIR_GRÜNE_DUMMY     760   0.109       0.0241     0.0845         0.222
## 11 cosine_similarity          760   0.0160      0.00127    0.0148         0.0793
## 12 AMENDMENT_DUMMY            760   0.250       0.0149     0.235          0.0597
## 13 delta_total_dict_matches   760   1.07        0.0539     1.01           0.0505
## 14 LR_DUMMY                   760   0.140       0.00697    0.133          0.0497
##    within_share R2_stateFE
##           <dbl>      <dbl>
##  1        0.414     0.586
##  2        0.486     0.514
##  3        0.584     0.416
##  4        0.601     0.399
##  5        0.629     0.371
##  6        0.700     0.300
##  7        0.706     0.294
##  8        0.739     0.261
##  9        0.744     0.256
## 10        0.778     0.222
## 11        0.921     0.0793
## 12        0.940     0.0597
## 13        0.950     0.0505
## 14        0.950     0.0497
```

```
cat("\nInterpretation:\n",
    "- between_share  fraction of X's variance removed by adding state FE.\n",
    "- within_share  fraction left for identification with state FE.\n",
    "- R2_stateFE should match between_share (X ~ state dummies).\n", sep = "")
```

```
##
## Interpretation:
## - between_share  fraction of X's variance removed by adding state FE.
## - within_share  fraction left for identification with state FE.
## - R2_stateFE should match between_share (X ~ state dummies).
```

```
# Optional: save
# out_dir <- file.path(getwd(), "tables"); dir.create(out_dir, showWarnings = FALSE, recursive = TRUE)
# utils::write.csv(tw_decomp, file.path(out_dir, "two_way_fe_variance.csv"), row.names = FALSE)
```

— REGRESSIONS —

Models for cosine_similarity and delta_total_dict_matches with just Pooled OLS and with Pooled OLS with State FE

```r
rhs_steps <- list(
  c("PROP_WOM"),
  c("CHAIR_WOM_DUMMY"),
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM"),
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","MINISTER_WOM_DUMMY
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","MINISTER_WOM_DUMMY
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","MINISTER_WOM_DUMMY
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","MINISTER_WOM_DUMMY
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","MINISTER_WOM_DUMMY
)

build_formula <- function(dv, k, fe_mode = c("none","state")) {
  fe_mode <- match.arg(fe_mode)
  rhs <- paste(rhs_steps[[k]], collapse = " + ")
  if (fe_mode == "none") {
    as.formula(paste0(dv, " ~ ", rhs))
  } else {
    as.formula(paste0(dv, " ~ ", rhs, " | state_code"))
  }
}

run_series <- function(dv, fe_mode = c("none","state")) {
  fe_mode <- match.arg(fe_mode)
  mods <- vector("list", length(rhs_steps))
  for (k in seq_along(rhs_steps)) {
    fml <- build_formula(dv, k, fe_mode)
    mods[[k]] <- feols(fml, data = merged_df)
  }
  names(mods) <- paste0(seq_along(rhs_steps))
  mods
}

# Build series
mods_cos_none  <- run_series("cosine_similarity", fe_mode = "none")
mods_cos_state <- run_series("cosine_similarity", fe_mode = "state")
```

```
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
```

```r
mods_del_none  <- run_series("delta_total_dict_matches", fe_mode = "none")
mods_del_state <- run_series("delta_total_dict_matches", fe_mode = "state")
```

```
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
```

```r
# Metrics
mae_vec  <- function(models) sapply(models, function(m) mean(abs(residuals(m)), na.rm = TRUE))
rmse_vec <- function(models) sapply(models, function(m) sqrt(mean(residuals(m)^2, na.rm = TRUE)))


strip_se_type <- function(x) {
  lines <- strsplit(x, "\n", fixed = TRUE)[[1]]
  lines <- lines[!grepl("^S\\.E\\. type", lines)]
  paste(lines, collapse = "\n")
}

# Console preview; prints MAE/RMSE below
print_etable_clean <- function(models) {
  tbl_str <- capture.output(etable(models, se.below = TRUE, fitstat = c("n","r2","rmse")))
  cat(strip_se_type(paste(tbl_str, collapse = "\n")), "\n")
  cat("\nMAE:\n"); print(round(mae_vec(models), 4))
}

# Export using modelsummary (works for both LaTeX/HTML); adds RMSE and MAE rows
export_etable <- function(models, file_tex, file_html = NULL) {
  if (!requireNamespace("modelsummary", quietly = TRUE)) install.packages("modelsummary")
  library(modelsummary)

  ms_list <- models; names(ms_list) <- names(models)

  # Add RMSE and MAE rows
  mae_vals  <- round(mae_vec(models), 4)
  add_rows_df <- rbind(
    data.frame(term = "MAE",  t(mae_vals),  check.names = FALSE)
  )
  colnames(add_rows_df)[-1] <- names(models)

  # LaTeX
  modelsummary(
    ms_list,
    output   = file_tex,
    stars    = c("+"=.1,"*"=.05,"**"=.01,"***"=.001),
    gof_omit = "IC|Log|Adj|AIC|BIC",
    add_rows = add_rows_df
  )

  # HTML
  if (!is.null(file_html)) {
    modelsummary(
      ms_list,
      output   = file_html,
      stars    = c("+"=.1,"*"=.05,"**"=.01,"***"=.001),
      gof_omit = "IC|Log|Adj|AIC|BIC",
      add_rows = add_rows_df
    )
  }
  message("Wrote: ",
          normalizePath(file_tex, winslash = "\\"),
```

```
          if (!is.null(file_html)) paste0(" and ", normalizePath(file_html, winslash = "\\")) else "")
}

# Output dir
out_dir <- file.path(getwd(), "tables"); dir.create(out_dir, showWarnings = FALSE, recursive = TRUE)

# Write LaTeX + HTML
export_etable(mods_cos_none,
              file_tex  = file.path(out_dir, "S1_cosine_noFE_8cols.tex"),
              file_html = file.path(out_dir, "S1_cosine_noFE_8cols.html"))
```

```
## Warning: To compile a LaTeX document with this table, the following commands must be placed in the d
##
## \usepackage{tabularray}
## \usepackage{float}
## \usepackage{graphicx}
## \usepackage{codehigh}
## \usepackage[normalem]{ulem}
## \UseTblrLibrary{booktabs}
## \UseTblrLibrary{siunitx}
## \newcommand{\tinytableTabularrayUnderline}[1]{\underline{#1}}
## \newcommand{\tinytableTabularrayStrikeout}[1]{\sout{#1}}
## \NewTableCommand{\tinytableDefineColor}[3]{\definecolor{#1}{#2}{#3}}
##
## To disable `siunitx` and prevent `modelsummary` from wrapping numeric entries in `\num{}`, call:
##
## options("modelsummary_format_numeric_latex" = "plain")
##  This warning appears once per session.
```

```
## Wrote: \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\tables\S1_cosine_noFE_8cols.tex and \\a
```

```
export_etable(mods_cos_state,
              file_tex  = file.path(out_dir, "S2_cosine_stateFE_8cols.tex"),
              file_html = file.path(out_dir, "S2_cosine_stateFE_8cols.html"))
```

```
## Wrote: \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\tables\S2_cosine_stateFE_8cols.tex and
```

```
export_etable(mods_del_none,
              file_tex  = file.path(out_dir, "S3_delta_noFE_8cols.tex"),
              file_html = file.path(out_dir, "S3_delta_noFE_8cols.html"))
```

```
## Wrote: \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\tables\S3_delta_noFE_8cols.tex and \\ad
```

```
export_etable(mods_del_state,
              file_tex  = file.path(out_dir, "S4_delta_stateFE_8cols.tex"),
              file_html = file.path(out_dir, "S4_delta_stateFE_8cols.html"))
```

```
## Wrote: \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\tables\S4_delta_stateFE_8cols.tex and \
```

```r
# Console previews
cat("\nCosine (no FE)\n");        print_etable_clean(mods_cos_none)
```

```
##
## Cosine (no FE)

##                                          1                 2
## Dependent Var.:            cosine_similarity cosine_similarity
##
## Constant                           0.8951***         0.9128***
##                                   (0.0096)          (0.0051)
## PROP_WOM                           0.0656*
##                                   (0.0267)
## CHAIR_WOM_DUMMY                                      0.0175
##                                                     (0.0120)
## PROP_WOM x CHAIR_WOM_DUMMY
##
## COMM_CHAIR_GRÜNE_DUMMY
##
## MINISTER_WOM_DUMMY
##
## MINISTER_GRÜNE_DUMMY
##
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## ------------------------- ----------------- -----------------
## Observations                            760               760
## R2                                  0.00789           0.00282
## RMSE                                0.12602           0.12634
##
##                                          3                 4
## Dependent Var.:            cosine_similarity cosine_similarity
##
## Constant                           0.8932***         0.8971***
##                                   (0.0101)          (0.0107)
## PROP_WOM                           0.0627*           0.0614*
##                                   (0.0281)          (0.0283)
## CHAIR_WOM_DUMMY                    0.0141            0.0117
##                                   (0.0340)          (0.0348)
```

```
## PROP_WOM x CHAIR_WOM_DUMMY         0.0038            0.0199
##                                   (0.0931)          (0.0959)
## COMM_CHAIR_GRÜNE_DUMMY                              -0.0089
##                                                     (0.0147)
## MINISTER_WOM_DUMMY                                  -0.0104
##                                                     (0.0103)
## MINISTER_GRÜNE_DUMMY                                0.0012
##                                                     (0.0121)
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## ------------------------- ----------------- -----------------
## Observations                            760               760
## R2                                  0.01007           0.01221
## RMSE                                0.12588           0.12575
##
##                                           5                 6
## Dependent Var.:            cosine_similarity cosine_similarity
##
## Constant                           0.7943***         0.6476***
##                                   (0.0146)          (0.0773)
## PROP_WOM                           0.0627*           0.0415
##                                   (0.0255)          (0.0277)
## CHAIR_WOM_DUMMY                    0.0097           -0.0115
##                                   (0.0314)          (0.0326)
## PROP_WOM x CHAIR_WOM_DUMMY         0.0039            0.0644
##                                   (0.0864)          (0.0896)
## COMM_CHAIR_GRÜNE_DUMMY            -0.0093           -0.0144
##                                   (0.0133)          (0.0140)
## MINISTER_WOM_DUMMY                 0.0016            0.0022
##                                   (0.0093)          (0.0094)
## MINISTER_GRÜNE_DUMMY               0.0012           -0.0114
##                                   (0.0109)          (0.0118)
## LR_DUMMY                           0.1367***         0.1343***
##                                   (0.0113)          (0.0113)
## AMENDMENT_DUMMY                   -0.0261**         -0.0298***
##                                   (0.0085)          (0.0085)
## AVG_AGE_START                                        0.0043**
##                                                     (0.0016)
## AVG_EDU                                             -0.0298*
##                                                     (0.0130)
```

```
## AVG_OCCEXP_BROAD_UMWELT                              0.0290
##                                                     (0.0594)
## EAST_DUMMY                                           0.0033
##                                                     (0.0119)
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## ------------------------- ----------------- -----------------
## Observations                           760               760
## R2                                 0.20066           0.21658
## RMSE                               0.11312           0.11198
##
##                                          7                 8
## Dependent Var.:            cosine_similarity cosine_similarity
##
## Constant                            0.6474***         0.6454***
##                                    (0.0787)          (0.0790)
## PROP_WOM                            0.0413            0.0337
##                                    (0.0296)          (0.0357)
## CHAIR_WOM_DUMMY                    -0.0115           -0.0132
##                                    (0.0327)          (0.0330)
## PROP_WOM x CHAIR_WOM_DUMMY          0.0647            0.0678
##                                    (0.0911)          (0.0915)
## COMM_CHAIR_GRÜNE_DUMMY             -0.0144           -0.0151
##                                    (0.0142)          (0.0143)
## MINISTER_WOM_DUMMY                  0.0022            0.0010
##                                    (0.0094)          (0.0099)
## MINISTER_GRÜNE_DUMMY               -0.0114           -0.0118
##                                    (0.0126)          (0.0126)
## LR_DUMMY                            0.1343***         0.1343***
##                                    (0.0113)          (0.0113)
## AMENDMENT_DUMMY                    -0.0297***        -0.0297***
##                                    (0.0085)          (0.0086)
## AVG_AGE_START                       0.0043*           0.0042*
##                                    (0.0017)          (0.0017)
## AVG_EDU                            -0.0298*          -0.0291*
##                                    (0.0130)          (0.0131)
## AVG_OCCEXP_BROAD_UMWELT             0.0288            0.0304
##                                    (0.0606)          (0.0608)
## EAST_DUMMY                          0.0033            0.0022
##                                    (0.0119)          (0.0123)
## ALIGN_CHAIR_MINISTER               -0.0002            0.0007
##                                    (0.0098)          (0.0100)
## PROP_WOM_IN_PARL                                      0.0297
##                                                     (0.0776)
## ------------------------- ----------------- -----------------
## Observations                           760               760
## R2                                 0.21658           0.21673
## RMSE                               0.11198           0.11197
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## MAE:
```

```
##      1      2      3      4      5      6      7      8
## 0.0858 0.0861 0.0856 0.0853 0.0756 0.0744 0.0744 0.0744
```

```
cat("\nCosine (state FE)\n");    print_etable_clean(mods_cos_state)
```

```
##
## Cosine (state FE)

##                                          1                 2
## Dependent Var.:            cosine_similarity cosine_similarity
##
## PROP_WOM                           0.1018**
##                                   (0.0338)
## CHAIR_WOM_DUMMY                                        0.0123
##                                                       (0.0135)
## PROP_WOM x CHAIR_WOM_DUMMY
##
## COMM_CHAIR_GRÜNE_DUMMY
##
## MINISTER_WOM_DUMMY
##
## MINISTER_GRÜNE_DUMMY
##
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## Fixed-Effects:             ----------------- -----------------
## state_code                               Yes               Yes
## -------------------------- ----------------- -----------------
## Observations                             760               760
## R2                                   0.09042           0.08035
## RMSE                                 0.12066           0.12133
##
##                                          3                 4
## Dependent Var.:            cosine_similarity cosine_similarity
##
## PROP_WOM                           0.0931*          0.0982**
##                                   (0.0362)         (0.0367)
## CHAIR_WOM_DUMMY                   -0.0120           0.0016
##                                   (0.0369)         (0.0383)
## PROP_WOM x CHAIR_WOM_DUMMY         0.0743           0.0453
##                                   (0.1005)         (0.1044)
```

```
## COMM_CHAIR_GRÜNE_DUMMY                                0.0066
##                                                      (0.0166)
## MINISTER_WOM_DUMMY                                   -0.0170
##                                                      (0.0129)
## MINISTER_GRÜNE_DUMMY                                -0.0117
##                                                      (0.0137)
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## Fixed-Effects:             ----------------- -----------------
## state_code                               Yes               Yes
## ------------------------- ----------------- -----------------
## Observations                             760               760
## R2                                   0.09231           0.09531
## RMSE                                 0.12054           0.12034
##
##                                            5                 6
## Dependent Var.:            cosine_similarity cosine_similarity
##
## PROP_WOM                            0.0856*           0.0611
##                                    (0.0335)          (0.0369)
## CHAIR_WOM_DUMMY                    -4.93e-5          -0.0118
##                                    (0.0348)          (0.0359)
## PROP_WOM x CHAIR_WOM_DUMMY          0.0253            0.0718
##                                    (0.0949)          (0.0978)
## COMM_CHAIR_GRÜNE_DUMMY             0.0097           -0.0013
##                                    (0.0151)          (0.0158)
## MINISTER_WOM_DUMMY                 -0.0046           -0.0055
##                                    (0.0118)          (0.0118)
## MINISTER_GRÜNE_DUMMY               -0.0114           -0.0172
##                                    (0.0125)          (0.0131)
## LR_DUMMY                            0.1268***         0.1258***
##                                    (0.0114)          (0.0113)
## AMENDMENT_DUMMY                    -0.0284***        -0.0295***
##                                    (0.0085)          (0.0085)
## AVG_AGE_START                                         0.0044*
##                                                      (0.0020)
## AVG_EDU                                               0.0017
##                                                      (0.0158)
## AVG_OCCEXP_BROAD_UMWELT                               0.0121
##                                                      (0.0656)
## ALIGN_CHAIR_MINISTER
##
```

```
## PROP_WOM_IN_PARL
##
## Fixed-Effects:             ----------------- -----------------
## state_code                                Yes               Yes
## ------------------------- ----------------- -----------------
## Observations                              760               760
## R2                                    0.25540           0.26065
## RMSE                                  0.10917           0.10879
##
##                                             7                 8
## Dependent Var.:            cosine_similarity cosine_similarity
##
## PROP_WOM                             0.0614            0.0361
##                                     (0.0380)          (0.0431)
## CHAIR_WOM_DUMMY                     -0.0117           -0.0118
##                                     (0.0359)          (0.0359)
## PROP_WOM x CHAIR_WOM_DUMMY           0.0711            0.0751
##                                     (0.0995)          (0.0996)
## COMM_CHAIR_GRÜNE_DUMMY              -0.0012           -0.0031
##                                     (0.0161)          (0.0161)
## MINISTER_WOM_DUMMY                  -0.0056           -0.0095
##                                     (0.0118)          (0.0122)
## MINISTER_GRÜNE_DUMMY                -0.0170           -0.0184
##                                     (0.0137)          (0.0138)
## LR_DUMMY                             0.1258***         0.1248***
##                                     (0.0114)          (0.0114)
## AMENDMENT_DUMMY                     -0.0295***        -0.0297***
##                                     (0.0086)          (0.0085)
## AVG_AGE_START                        0.0044*           0.0037
##                                     (0.0021)          (0.0021)
## AVG_EDU                              0.0016            0.0059
##                                     (0.0158)          (0.0162)
## AVG_OCCEXP_BROAD_UMWELT              0.0127            0.0098
##                                     (0.0675)          (0.0675)
## ALIGN_CHAIR_MINISTER                 0.0004           -0.0006
##                                     (0.0111)          (0.0112)
## PROP_WOM_IN_PARL                                      0.1350
##                                                      (0.1080)
## Fixed-Effects:             ----------------- -----------------
## state_code                                Yes               Yes
## ------------------------- ----------------- -----------------
## Observations                              760               760
## R2                                    0.26065           0.26222
## RMSE                                  0.10879           0.10867
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## MAE:
##      1      2      3      4      5      6      7      8
## 0.0804 0.0811 0.0803 0.0801 0.0723 0.0721 0.0721 0.0721
```

```
cat("\nDelta (no FE)\n");        print_etable_clean(mods_del_none)
```

```
##
```

```
## Delta (no FE)

##                                              1                          2
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## Constant                                -0.0262                   0.1090**
##                                         (0.0788)                  (0.0414)
## PROP_WOM                                 0.4840*
##                                         (0.2183)
## CHAIR_WOM_DUMMY                                                    0.1043
##                                                                   (0.0978)
## PROP_WOM x CHAIR_WOM_DUMMY
##
## COMM_CHAIR_GRÜNE_DUMMY
##
## MINISTER_WOM_DUMMY
##
## MINISTER_GRÜNE_DUMMY
##
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## ------------------------- ------------------------ ------------------------
## Observations                                  760                        760
## R2                                        0.00644                    0.00150
## RMSE                                       1.0294                     1.0320
##
##                                              3                          4
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## Constant                               -0.0810                   -0.0737
##                                        (0.0825)                  (0.0868)
## PROP_WOM                                0.6090**                  0.6032**
##                                        (0.2292)                  (0.2299)
## CHAIR_WOM_DUMMY                         0.6133*                   0.4925
##                                        (0.2774)                  (0.2834)
## PROP_WOM x CHAIR_WOM_DUMMY             -1.534*                   -1.149
##                                        (0.7593)                  (0.7802)
## COMM_CHAIR_GRÜNE_DUMMY                                          -0.2455*
##                                                                  (0.1198)
## MINISTER_WOM_DUMMY                                               0.0360
```

```
##                                                                  (0.0835)
## MINISTER_GRÜNE_DUMMY                                            0.0633
##                                                                  (0.0984)
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## ------------------------- ------------------------ ------------------------
## Observations                                  760                      760
## R2                                        0.01285                  0.01884
## RMSE                                       1.0261                   1.0230
##
##                                                 5                        6
## Dependent Var.:           delta_total_dict_matches delta_total_dict_matches
##
## Constant                                 -0.1567                   1.879**
##                                          (0.1315)                 (0.6987)
## PROP_WOM                                  0.6042**                 0.7244**
##                                          (0.2301)                 (0.2505)
## CHAIR_WOM_DUMMY                           0.4908                   0.5757
##                                          (0.2836)                 (0.2946)
## PROP_WOM x CHAIR_WOM_DUMMY               -1.161                   -1.520
##                                          (0.7807)                 (0.8098)
## COMM_CHAIR_GRÜNE_DUMMY                   -0.2460*                 -0.0821
##                                          (0.1200)                 (0.1265)
## MINISTER_WOM_DUMMY                        0.0456                   0.0005
##                                          (0.0839)                 (0.0846)
## MINISTER_GRÜNE_DUMMY                     0.0633                   0.1889
##                                          (0.0985)                 (0.1065)
## LR_DUMMY                                  0.1099                   0.1250
##                                          (0.1022)                 (0.1018)
## AMENDMENT_DUMMY                          -0.0204                   0.0054
##                                          (0.0764)                 (0.0770)
## AVG_AGE_START                                                     -0.0360*
##                                                                  (0.0148)
## AVG_EDU                                                          -0.3274**
##                                                                  (0.1172)
## AVG_OCCEXP_BROAD_UMWELT                                           0.4120
##                                                                  (0.5368)
## EAST_DUMMY                                                        0.2159*
##                                                                  (0.1078)
## ALIGN_CHAIR_MINISTER
```

```
##
## PROP_WOM_IN_PARL
##
## ------------------------ ------------------------ ------------------------
## Observations                                  760                      760
## R2                                        0.02066                  0.04037
## RMSE                                       1.0220                   1.0117
##
##                                                7                        8
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## Constant                                  1.923**                  1.883**
##                                          (0.7113)                 (0.7130)
## PROP_WOM                                  0.7560**                  0.5999
##                                          (0.2671)                 (0.3220)
## CHAIR_WOM_DUMMY                           0.5822*                   0.5472
##                                          (0.2954)                 (0.2982)
## PROP_WOM x CHAIR_WOM_DUMMY               -1.570                   -1.508
##                                          (0.8230)                 (0.8262)
## COMM_CHAIR_GRÜNE_DUMMY                  -0.0753                  -0.0887
##                                          (0.1281)                 (0.1291)
## MINISTER_WOM_DUMMY                        0.0022                  -0.0216
##                                          (0.0848)                 (0.0891)
## MINISTER_GRÜNE_DUMMY                     0.2022                   0.1945
##                                          (0.1135)                 (0.1138)
## LR_DUMMY                                  0.1243                   0.1234
##                                          (0.1018)                 (0.1019)
## AMENDMENT_DUMMY                           0.0041                   0.0056
##                                          (0.0772)                 (0.0772)
## AVG_AGE_START                            -0.0374*                 -0.0394*
##                                          (0.0154)                 (0.0156)
## AVG_EDU                                  -0.3278**                -0.3145**
##                                          (0.1173)                 (0.1183)
## AVG_OCCEXP_BROAD_UMWELT                   0.4489                   0.4833
##                                          (0.5478)                 (0.5493)
## EAST_DUMMY                                0.2155*                  0.1925
##                                          (0.1078)                 (0.1111)
## ALIGN_CHAIR_MINISTER                      0.0302                   0.0478
##                                          (0.0884)                 (0.0907)
## PROP_WOM_IN_PARL                                                   0.6088
##                                                                  (0.7012)
## ------------------------ ------------------------ ------------------------
## Observations                                  760                      760
## R2                                        0.04052                  0.04149
## RMSE                                       1.0116                   1.0111
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## MAE:
##      1      2      3      4      5      6      7      8
## 0.4303 0.4294 0.4343 0.4486 0.4514 0.4578 0.4581 0.4601
```

```
cat("\nDelta (state FE)\n");     print_etable_clean(mods_del_state)
```

```
##
## Delta (state FE)

##                                          1                          2
## Dependent Var.:           delta_total_dict_matches delta_total_dict_matches
##
## PROP_WOM                                -0.2125
##                                         (0.2817)
## CHAIR_WOM_DUMMY                                                     0.1740
##                                                                    (0.1114)
## PROP_WOM x CHAIR_WOM_DUMMY
##
## COMM_CHAIR_GRÜNE_DUMMY
##
## MINISTER_WOM_DUMMY
##
## MINISTER_GRÜNE_DUMMY
##
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## Fixed-Effects:            ----------------------- -----------------------
## state_code                                  Yes                        Yes
## ------------------------- ----------------------- -----------------------
## Observations                                760                        760
## R2                                      0.05122                    0.05360
## RMSE                                     1.0060                     1.0047
##
##                                          3                          4
## Dependent Var.:           delta_total_dict_matches delta_total_dict_matches
##
## PROP_WOM                                -0.0859                    -0.0825
##                                         (0.3018)                   (0.3056)
## CHAIR_WOM_DUMMY                          0.4737                     0.3314
##                                         (0.3069)                   (0.3189)
## PROP_WOM x CHAIR_WOM_DUMMY              -0.8832                    -0.5025
##                                         (0.8365)                   (0.8687)
## COMM_CHAIR_GRÜNE_DUMMY                                             -0.1742
##                                                                    (0.1382)
## MINISTER_WOM_DUMMY                                                  0.1445
##                                                                    (0.1074)
## MINISTER_GRÜNE_DUMMY                                               0.0393
##                                                                    (0.1142)
```

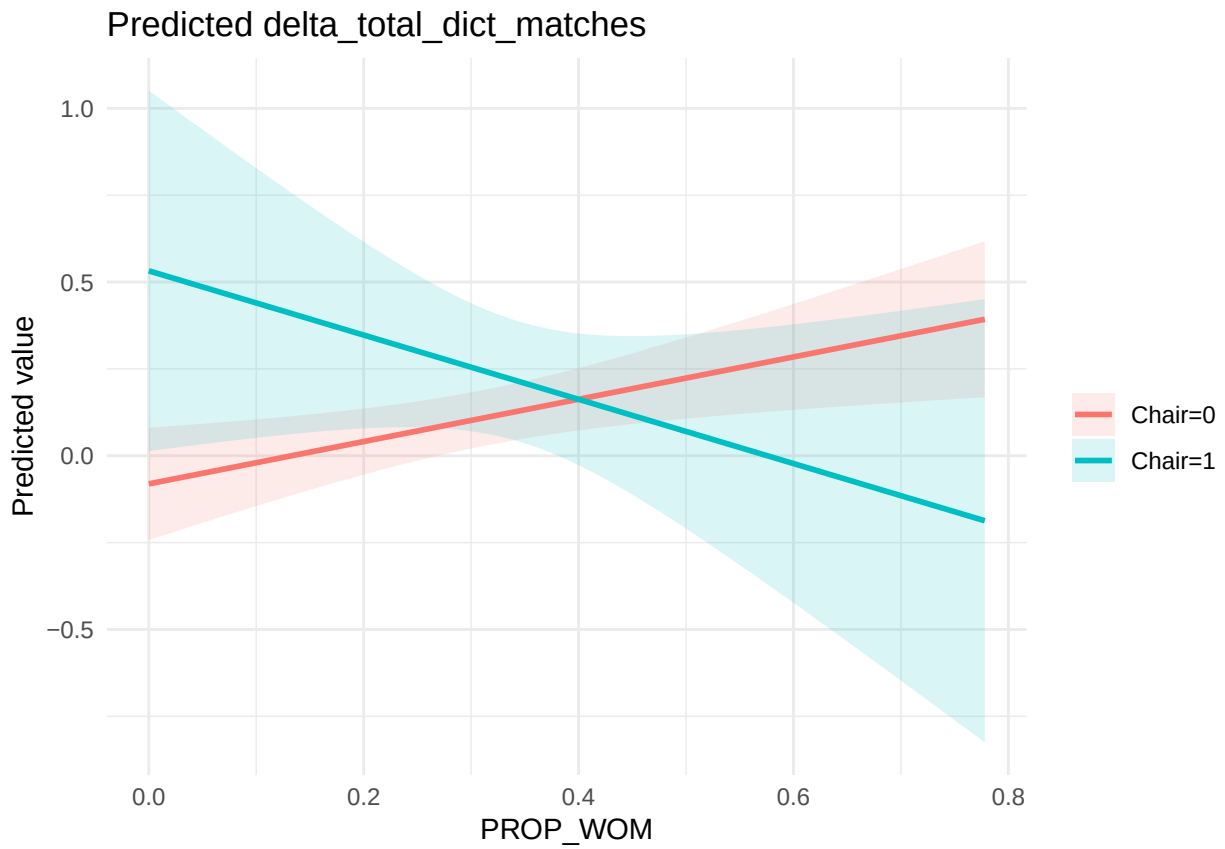
```
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## Fixed-Effects:             ------------------------ ------------------------
## state_code                                      Yes                      Yes
## -------------------------- ------------------------ ------------------------
## Observations                                    760                      760
## R2                                          0.05566                  0.05915
## RMSE                                         1.0036                   1.0018
##
##                                                  5                        6
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## PROP_WOM                                    -0.1062                   0.1364
##                                             (0.3074)                 (0.3368)
## CHAIR_WOM_DUMMY                              0.3240                   0.3176
##                                             (0.3193)                 (0.3275)
## PROP_WOM x CHAIR_WOM_DUMMY                  -0.5002                  -0.7557
##                                             (0.8702)                 (0.8928)
## COMM_CHAIR_GRÜNE_DUMMY                      -0.1720                  -0.0865
##                                             (0.1383)                 (0.1447)
## MINISTER_WOM_DUMMY                           0.1550                   0.1538
##                                             (0.1078)                 (0.1074)
## MINISTER_GRÜNE_DUMMY                        0.0379                   0.1632
##                                             (0.1143)                 (0.1200)
## LR_DUMMY                                     0.1245                   0.1370
##                                             (0.1040)                 (0.1036)
## AMENDMENT_DUMMY                              0.0101                   0.0160
##                                             (0.0782)                 (0.0780)
## AVG_AGE_START                                                        -0.0399*
##                                                                      (0.0184)
## AVG_EDU                                                              -0.3154*
##                                                                      (0.1441)
## AVG_OCCEXP_BROAD_UMWELT                                               0.7393
##                                                                      (0.5991)
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## Fixed-Effects:             ------------------------ ------------------------
## state_code                                      Yes                      Yes
## -------------------------- ------------------------ ------------------------
## Observations                                    760                      760
```

```
## R2                                          0.06100                  0.07508
## RMSE                                         1.0008                  0.99324
##
##                                                 7                        8
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## PROP_WOM                                    0.0918                   0.0113
##                                            (0.3469)                 (0.3935)
## CHAIR_WOM_DUMMY                             0.3123                   0.3120
##                                            (0.3278)                 (0.3280)
## PROP_WOM x CHAIR_WOM_DUMMY                 -0.6650                  -0.6523
##                                            (0.9087)                 (0.9097)
## COMM_CHAIR_GRÜNE_DUMMY                     -0.0992                  -0.1054
##                                            (0.1467)                 (0.1474)
## MINISTER_WOM_DUMMY                          0.1594                   0.1469
##                                            (0.1079)                 (0.1118)
## MINISTER_GRÜNE_DUMMY                       0.1439                   0.1396
##                                            (0.1252)                 (0.1257)
## LR_DUMMY                                    0.1369                   0.1339
##                                            (0.1036)                 (0.1039)
## AMENDMENT_DUMMY                             0.0168                   0.0161
##                                            (0.0780)                 (0.0781)
## AVG_AGE_START                              -0.0376*                 -0.0398*
##                                            (0.0189)                 (0.0196)
## AVG_EDU                                    -0.3125*                 -0.2988*
##                                            (0.1443)                 (0.1477)
## AVG_OCCEXP_BROAD_UMWELT                     0.6614                   0.6521
##                                            (0.6162)                 (0.6170)
## ALIGN_CHAIR_MINISTER                       -0.0552                  -0.0584
##                                            (0.1016)                 (0.1019)
## PROP_WOM_IN_PARL                                                    0.4283
##                                                                    (0.9872)
## Fixed-Effects:             ------------------------ ------------------------
## state_code                                      Yes                      Yes
## -------------------------- ------------------------ ------------------------
## Observations                                    760                      760
## R2                                          0.07545                  0.07569
## RMSE                                        0.99304                  0.99291
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## MAE:
##      1      2      3      4      5      6      7      8
## 0.4635 0.4718 0.4708 0.4757 0.4784 0.4766 0.4751 0.4741
```

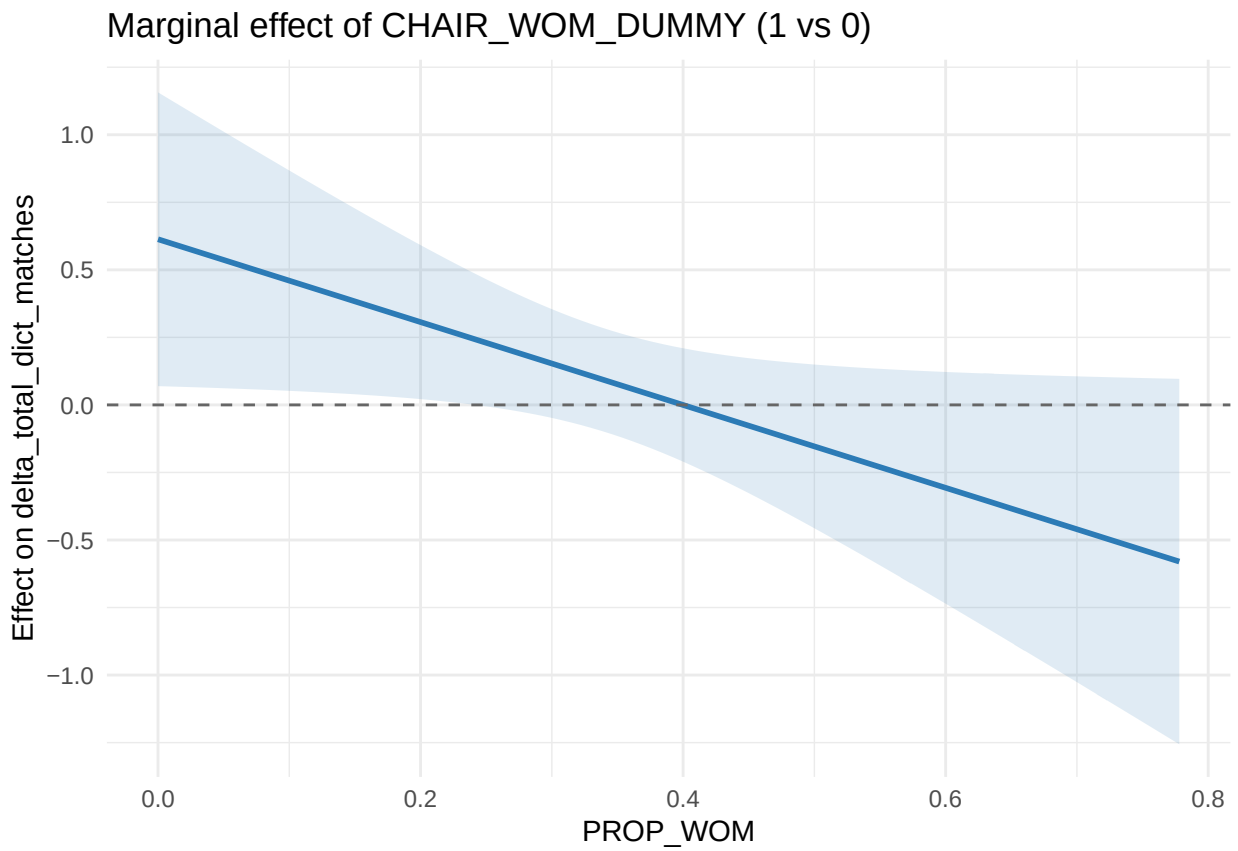
Marginal effects plot for the interaction model between PROP_WOM and CHAIR_WOM_DUMMY with dict delta

```r
suppressPackageStartupMessages(library(ggplot2))

# 1) Estimate interaction model
mod_int <- lm(delta_total_dict_matches ~ PROP_WOM * CHAIR_WOM_DUMMY, data = merged_df)

# 2) Prediction grid for lines (chair = 0 / 1)
```

```r
rng <- range(merged_df$PROP_WOM, na.rm = TRUE)
grid_pred <- expand.grid(
  PROP_WOM = seq(rng[1], rng[2], length.out = 100),
  CHAIR_WOM_DUMMY = c(0, 1)
)

pred_obj <- predict(mod_int, newdata = grid_pred, se.fit = TRUE)
grid_pred$fit <- pred_obj$fit
grid_pred$se  <- pred_obj$se.fit
grid_pred$lo  <- grid_pred$fit - 1.96 * grid_pred$se
grid_pred$hi  <- grid_pred$fit + 1.96 * grid_pred$se
grid_pred$chair_fac <- factor(grid_pred$CHAIR_WOM_DUMMY, labels = c("Chair=0","Chair=1"))

p1 <- ggplot(grid_pred, aes(PROP_WOM, fit, color = chair_fac, fill = chair_fac)) +
  geom_ribbon(aes(ymin = lo, ymax = hi), alpha = 0.15, color = NA) +
  geom_line(linewidth = 1) +  # use linewidth (not size) for ggplot >= 3.4
  labs(title = "Predicted delta_total_dict_matches",
       x = "PROP_WOM",
       y = "Predicted value",
       color = "", fill = "") +
  theme_minimal()

print(p1)
```



```r
# 3) Marginal effect of CHAIR_WOM_DUMMY across PROP_WOM
b <- coef(mod_int)
V <- vcov(mod_int)
b_chair <- b["CHAIR_WOM_DUMMY"]
b_int   <- b["PROP_WOM:CHAIR_WOM_DUMMY"]

grid_me <- data.frame(PROP_WOM = seq(rng[1], rng[2], length.out = 100))
grid_me$AME_chair <- b_chair + b_int * grid_me$PROP_WOM
# Var(b_chair + x*b_int) = Var(b_chair) + x^2 Var(b_int) + 2x Cov(b_chair,b_int)
v_chair <- V["CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY"]
v_int   <- V["PROP_WOM:CHAIR_WOM_DUMMY","PROP_WOM:CHAIR_WOM_DUMMY"]
cov_ci  <- V["CHAIR_WOM_DUMMY","PROP_WOM:CHAIR_WOM_DUMMY"]
grid_me$SE_AME <- sqrt(v_chair + (grid_me$PROP_WOM^2)*v_int + 2*grid_me$PROP_WOM*cov_ci)
grid_me$LO <- grid_me$AME_chair - 1.96 * grid_me$SE_AME
grid_me$HI <- grid_me$AME_chair + 1.96 * grid_me$SE_AME

p2 <- ggplot(grid_me, aes(PROP_WOM, AME_chair)) +
  geom_ribbon(aes(ymin = LO, ymax = HI), alpha = 0.15, fill = "#2C7BB6") +
  geom_line(color = "#2C7BB6", linewidth = 1) +
  geom_hline(yintercept = 0, linetype = 2, color = "gray40") +
  labs(title = "Marginal effect of CHAIR_WOM_DUMMY (1 vs 0)",
       x = "PROP_WOM",
       y = "Effect on delta_total_dict_matches") +
  theme_minimal()

print(p2)
```




```
# 4) Slopes of PROP_WOM by chair status (constant across PROP_WOM)
slope_chair0 <- b["PROP_WOM"]
slope_chair1 <- b["PROP_WOM"] + b_int
cat("\nSlope of PROP_WOM when CHAIR_WOM_DUMMY=0:", round(slope_chair0, 4), "\n")
```

```
##
## Slope of PROP_WOM when CHAIR_WOM_DUMMY=0: 0.609
```

```
cat("Slope of PROP_WOM when CHAIR_WOM_DUMMY=1:", round(slope_chair1, 4), "\n")
```

```
## Slope of PROP_WOM when CHAIR_WOM_DUMMY=1: -0.9246
```

```
# 5) Save figures (PNG + PDF)
fig_dir <- file.path(getwd(), "figures")
dir.create(fig_dir, showWarnings = FALSE, recursive = TRUE)

ggsave(filename = file.path(fig_dir, "predicted_delta_lines.png"),
       plot = p1, width = 7, height = 5, dpi = 300, units = "in")
ggsave(filename = file.path(fig_dir, "predicted_delta_lines.pdf"),
       plot = p1, width = 7, height = 5, units = "in")

ggsave(filename = file.path(fig_dir, "marginal_effect_chair.png"),
       plot = p2, width = 7, height = 5, dpi = 300, units = "in")
ggsave(filename = file.path(fig_dir, "marginal_effect_chair.pdf"),
```

```r
       plot = p2, width = 7, height = 5, units = "in")

cat("Saved figures to:\n", normalizePath(fig_dir, winslash = "\\"), "\n")
```

```
## Saved figures to:
##  \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\figures
```

This model breaks down the demographic variables one-by-one (to be presented in the appendix) Looking at the table it produces with cosine_similarity as the dependent variable (no state fixed effects), one can see that AVG_AGE_START is the variable that pulls the significance away from PROP_WOM

```r
rhs_steps <- list(
  c("PROP_WOM"),
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM"),
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","MINISTER_WOM_DUMMY
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","MINISTER_WOM_DUMMY
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","MINISTER_WOM_DUMMY
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","MINISTER_WOM_DUMMY
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","MINISTER_WOM_DUMMY
)

build_formula <- function(dv, k, fe_mode = c("none","state")) {
  fe_mode <- match.arg(fe_mode)
  rhs <- paste(rhs_steps[[k]], collapse = " + ")
  if (fe_mode == "none") {
    as.formula(paste0(dv, " ~ ", rhs))
  } else {
    as.formula(paste0(dv, " ~ ", rhs, " | state_code"))
  }
}

run_series <- function(dv, fe_mode = c("none","state")) {
  fe_mode <- match.arg(fe_mode)
  mods <- vector("list", length(rhs_steps))
  for (k in seq_along(rhs_steps)) {
    fml <- build_formula(dv, k, fe_mode)
    mods[[k]] <- feols(fml, data = merged_df)
  }
  names(mods) <- paste0(seq_along(rhs_steps))
  mods
}

# Build series
mods_cos_none  <- run_series("cosine_similarity", fe_mode = "none")
mods_cos_state <- run_series("cosine_similarity", fe_mode = "state")
```

```
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
```

```r
mods_del_none  <- run_series("delta_total_dict_matches", fe_mode = "none")
mods_del_state <- run_series("delta_total_dict_matches", fe_mode = "state")
```

```
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
```

```
# Metrics
mae_vec  <- function(models) sapply(models, function(m) mean(abs(residuals(m)), na.rm = TRUE))
rmse_vec <- function(models) sapply(models, function(m) sqrt(mean(residuals(m)^2, na.rm = TRUE)))

strip_se_type <- function(x) {
  lines <- strsplit(x, "\n", fixed = TRUE)[[1]]
  lines <- lines[!grepl("^S\\.E\\. type", lines)]
  paste(lines, collapse = "\n")
}

# Console preview
print_etable_clean <- function(models) {
  tbl_str <- capture.output(etable(models, se.below = TRUE, fitstat = c("n","r2","rmse")))
  cat(strip_se_type(paste(tbl_str, collapse = "\n")), "\n")
  cat("\nMAE:\n"); print(round(mae_vec(models), 4))
}

# Export using modelsummary (works for both LaTeX/HTML); adds RMSE and MAE rows
export_etable <- function(models, file_tex, file_html = NULL) {
  if (!requireNamespace("modelsummary", quietly = TRUE)) install.packages("modelsummary")
  library(modelsummary)

  ms_list <- models; names(ms_list) <- names(models)

  # Add RMSE and MAE rows
  mae_vals  <- round(mae_vec(models), 4)
  add_rows_df <- rbind(
    data.frame(term = "MAE",  t(mae_vals),  check.names = FALSE)
  )
  colnames(add_rows_df)[-1] <- names(models)

  # LaTeX
  modelsummary(
    ms_list,
    output   = file_tex,
    stars    = c("+"=.1,"*"=.05,"**"=.01,"***"=.001),
    gof_omit = "IC|Log|Adj|AIC|BIC",
    add_rows = add_rows_df
  )

  # HTML
  if (!is.null(file_html)) {
    modelsummary(
      ms_list,
      output   = file_html,
      stars    = c("+"=.1,"*"=.05,"**"=.01,"***"=.001),
      gof_omit = "IC|Log|Adj|AIC|BIC",
      add_rows = add_rows_df
    )
  }
  message("Wrote: ",
```

```
          normalizePath(file_tex, winslash = "\\"),
          if (!is.null(file_html)) paste0(" and ", normalizePath(file_html, winslash = "\\")) else "")
}

# Output dir
out_dir <- file.path(getwd(), "tables"); dir.create(out_dir, showWarnings = FALSE, recursive = TRUE)

# Write LaTeX + HTML
export_etable(mods_cos_none,
              file_tex  = file.path(out_dir, "S1_cosine_noFE_7cols_demo.tex"),
              file_html = file.path(out_dir, "S1_cosine_noFE_7cols_demo.html"))
```

```
## Wrote: \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\tables\S1_cosine_noFE_7cols_demo.tex an
```

```
export_etable(mods_cos_state,
              file_tex  = file.path(out_dir, "S2_cosine_stateFE_7cols_demo.tex"),
              file_html = file.path(out_dir, "S2_cosine_stateFE_7cols_demo.html"))
```

```
## Wrote: \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\tables\S2_cosine_stateFE_7cols_demo.tex
```

```
export_etable(mods_del_none,
              file_tex  = file.path(out_dir, "S3_delta_noFE_7cols_demo.tex"),
              file_html = file.path(out_dir, "S3_delta_noFE_7cols_demo.html"))
```

```
## Wrote: \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\tables\S3_delta_noFE_7cols_demo.tex and
```

```
export_etable(mods_del_state,
              file_tex  = file.path(out_dir, "S4_delta_stateFE_7cols_demo.tex"),
              file_html = file.path(out_dir, "S4_delta_stateFE_7cols_demo.html"))
```

```
## Wrote: \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\tables\S4_delta_stateFE_7cols_demo.tex a
```

```
# Console previews
cat("\nCosine (no FE)\n");        print_etable_clean(mods_cos_none)
```

```
##
## Cosine (no FE)

##                                        1                2
## Dependent Var.:           cosine_similarity cosine_similarity
##
## Constant                         0.8951***        0.8932***
##                                 (0.0096)         (0.0101)
## PROP_WOM                         0.0656*          0.0627*
##                                 (0.0267)         (0.0281)
## CHAIR_WOM_DUMMY                                   0.0141
##                                                  (0.0340)
## PROP_WOM x CHAIR_WOM_DUMMY                        0.0038
##                                                  (0.0931)
## COMM_CHAIR_GRÜNE_DUMMY
```

```
##
## MINISTER_WOM_DUMMY
##
## MINISTER_GRÜNE_DUMMY
##
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY
##
## ------------------------- ----------------- -----------------
## Observations                           760               760
## R2                                 0.00789           0.01007
## RMSE                               0.12602           0.12588
##
##                                          3                 4
## Dependent Var.:            cosine_similarity cosine_similarity
##
## Constant                            0.7943***         0.5853***
##                                    (0.0146)          (0.0725)
## PROP_WOM                            0.0627*           0.0391
##                                    (0.0255)          (0.0266)
## CHAIR_WOM_DUMMY                     0.0097           -0.0103
##                                    (0.0314)          (0.0320)
## PROP_WOM x CHAIR_WOM_DUMMY          0.0039            0.0683
##                                    (0.0864)          (0.0887)
## COMM_CHAIR_GRÜNE_DUMMY             -0.0093           -0.0196
##                                    (0.0133)          (0.0137)
## MINISTER_WOM_DUMMY                  0.0016            0.0035
##                                    (0.0093)          (0.0093)
## MINISTER_GRÜNE_DUMMY                0.0012           -0.0118
##                                    (0.0109)          (0.0117)
## LR_DUMMY                            0.1367***         0.1348***
##                                    (0.0113)          (0.0113)
## AMENDMENT_DUMMY                    -0.0261**         -0.0282***
##                                    (0.0085)          (0.0084)
## AVG_AGE_START                                         0.0047**
##                                                      (0.0016)
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY
##
## ------------------------- ----------------- -----------------
## Observations                           760               760
## R2                                 0.20066           0.20976
```

```
## RMSE                                0.11312          0.11247
##
##                                           5                6
## Dependent Var.:            cosine_similarity cosine_similarity
##
## Constant                            0.8397***        0.7959***
##                                    (0.0220)         (0.0154)
## PROP_WOM                            0.0629*          0.0619*
##                                    (0.0254)         (0.0256)
## CHAIR_WOM_DUMMY                     0.0110           0.0119
##                                    (0.0313)         (0.0322)
## PROP_WOM x CHAIR_WOM_DUMMY         -0.0036          -0.0007
##                                    (0.0861)         (0.0876)
## COMM_CHAIR_GRÜNE_DUMMY             -0.0063          -0.0096
##                                    (0.0133)         (0.0133)
## MINISTER_WOM_DUMMY                  0.0014           0.0019
##                                    (0.0092)         (0.0093)
## MINISTER_GRÜNE_DUMMY               -0.0004           0.0009
##                                    (0.0109)         (0.0110)
## LR_DUMMY                            0.1357***        0.1365***
##                                    (0.0113)         (0.0113)
## AMENDMENT_DUMMY                    -0.0284***       -0.0263**
##                                    (0.0085)         (0.0085)
## AVG_AGE_START
##
## AVG_EDU                            -0.0281**
##                                    (0.0102)
## AVG_OCCEXP_BROAD_UMWELT                             -0.0171
##                                                     (0.0531)
## EAST_DUMMY
##
## ------------------------- ----------------- -----------------
## Observations                          760               760
## R2                                0.20858           0.20077
## RMSE                              0.11255           0.11311
##
##                                           7
## Dependent Var.:            cosine_similarity
##
## Constant                            0.7993***
##                                    (0.0148)
## PROP_WOM                            0.0690**
##                                    (0.0257)
## CHAIR_WOM_DUMMY                     0.0119
##                                    (0.0314)
## PROP_WOM x CHAIR_WOM_DUMMY         -0.0046
##                                    (0.0864)
## COMM_CHAIR_GRÜNE_DUMMY             -0.0125
##                                    (0.0134)
## MINISTER_WOM_DUMMY                  0.0031
##                                    (0.0093)
## MINISTER_GRÜNE_DUMMY               -0.0014
##                                    (0.0110)
## LR_DUMMY                            0.1361***
```

```
##                                    (0.0113)
## AMENDMENT_DUMMY                   -0.0286***
##                                    (0.0086)
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY                         -0.0159
##                                    (0.0095)
## ------------------------- -----------------
## Observations                            760
## R2                                  0.20363
## RMSE                                0.11291
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## MAE:
##      1      2      3      4      5      6      7
## 0.0858 0.0856 0.0756 0.0749 0.0748 0.0755 0.0752
```

```
cat("\nCosine (state FE)\n");    print_etable_clean(mods_cos_state)
```

```
##
## Cosine (state FE)

##                                          1                 2
## Dependent Var.:            cosine_similarity cosine_similarity
##
## PROP_WOM                          0.1018**           0.0931*
##                                  (0.0338)          (0.0362)
## CHAIR_WOM_DUMMY                                    -0.0120
##                                                    (0.0369)
## PROP_WOM x CHAIR_WOM_DUMMY                          0.0743
##                                                    (0.1005)
## COMM_CHAIR_GRÜNE_DUMMY
##
## MINISTER_WOM_DUMMY
##
## MINISTER_GRÜNE_DUMMY
##
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## Fixed-Effects:             ----------------- -----------------
```

```
## state_code                              Yes                Yes
## ------------------------- ----------------- -----------------
## Observations                            760                760
## R2                                  0.09042            0.09231
## RMSE                                0.12066            0.12054
##
##                                           3                  4
## Dependent Var.:            cosine_similarity  cosine_similarity
##
## PROP_WOM                           0.0856*            0.0586
##                                   (0.0335)           (0.0355)
## CHAIR_WOM_DUMMY                  -4.93e-5           -0.0107
##                                   (0.0348)           (0.0350)
## PROP_WOM x CHAIR_WOM_DUMMY         0.0253             0.0693
##                                   (0.0949)           (0.0966)
## COMM_CHAIR_GRÜNE_DUMMY            0.0097            -0.0013
##                                   (0.0151)           (0.0158)
## MINISTER_WOM_DUMMY               -0.0046            -0.0055
##                                   (0.0118)           (0.0117)
## MINISTER_GRÜNE_DUMMY             -0.0114            -0.0169
##                                   (0.0125)           (0.0127)
## LR_DUMMY                           0.1268***          0.1257***
##                                   (0.0114)           (0.0113)
## AMENDMENT_DUMMY                  -0.0284***         -0.0295***
##                                   (0.0085)           (0.0085)
## AVG_AGE_START                                         0.0045*
##                                                      (0.0020)
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## Fixed-Effects:             ----------------- -----------------
## state_code                              Yes                Yes
## ------------------------- ----------------- -----------------
## Observations                            760                760
## R2                                  0.25540            0.26059
## RMSE                                0.10917            0.10879
##
##                                           5                  6
## Dependent Var.:            cosine_similarity  cosine_similarity
##
## PROP_WOM                           0.0879**           0.0897**
##                                   (0.0338)           (0.0343)
## CHAIR_WOM_DUMMY                    0.0004            -0.0040
##                                   (0.0349)           (0.0356)
## PROP_WOM x CHAIR_WOM_DUMMY         0.0268             0.0342
##                                   (0.0950)           (0.0963)
## COMM_CHAIR_GRÜNE_DUMMY            0.0096             0.0090
##                                   (0.0151)           (0.0151)
## MINISTER_WOM_DUMMY               -0.0044            -0.0047
##                                   (0.0118)           (0.0118)
## MINISTER_GRÜNE_DUMMY             -0.0134            -0.0112
##                                   (0.0129)           (0.0125)
## LR_DUMMY                           0.1268***          0.1269***
```

```
##                                    (0.0114)          (0.0114)
## AMENDMENT_DUMMY                   -0.0282***        -0.0283***
##                                    (0.0085)          (0.0085)
## AVG_AGE_START
##
## AVG_EDU                            0.0085
##                                   (0.0149)
## AVG_OCCEXP_BROAD_UMWELT                              0.0344
##                                                     (0.0624)
## Fixed-Effects:              ----------------- -----------------
## state_code                                Yes               Yes
## -------------------------- ----------------- -----------------
## Observations                              760               760
## R2                                    0.25573           0.25571
## RMSE                                  0.10915           0.10915
##
##                                         7
## Dependent Var.:            cosine_similarity
##
## PROP_WOM                           0.0856*
##                                   (0.0335)
## CHAIR_WOM_DUMMY                   -4.93e-5
##                                   (0.0348)
## PROP_WOM x CHAIR_WOM_DUMMY         0.0253
##                                   (0.0949)
## COMM_CHAIR_GRÜNE_DUMMY            0.0097
##                                   (0.0151)
## MINISTER_WOM_DUMMY                -0.0046
##                                   (0.0118)
## MINISTER_GRÜNE_DUMMY             -0.0114
##                                   (0.0125)
## LR_DUMMY                           0.1268***
##                                   (0.0114)
## AMENDMENT_DUMMY                   -0.0284***
##                                   (0.0085)
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## Fixed-Effects:              -----------------
## state_code                                Yes
## -------------------------- -----------------
## Observations                              760
## R2                                    0.25540
## RMSE                                  0.10917
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## MAE:
##      1      2      3      4      5      6      7
## 0.0804 0.0803 0.0723 0.0721 0.0724 0.0723 0.0723
```

```
cat("\nDelta (no FE)\n");        print_etable_clean(mods_del_none)
```

```
##
## Delta (no FE)

##                                              1                          2
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## Constant                                  -0.0262                   -0.0810
##                                           (0.0788)                  (0.0825)
## PROP_WOM                                   0.4840*                   0.6090**
##                                           (0.2183)                  (0.2292)
## CHAIR_WOM_DUMMY                                                      0.6133*
##                                                                     (0.2774)
## PROP_WOM x CHAIR_WOM_DUMMY                                          -1.534*
##                                                                     (0.7593)
## COMM_CHAIR_GRÜNE_DUMMY
##
## MINISTER_WOM_DUMMY
##
## MINISTER_GRÜNE_DUMMY
##
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY
##
## ------------------------- ------------------------- -------------------------
## Observations                                   760                       760
## R2                                         0.00644                   0.01285
## RMSE                                        1.0294                    1.0261
##
##                                              3                          4
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## Constant                                  -0.1567                    1.527*
##                                           (0.1315)                  (0.6562)
## PROP_WOM                                   0.6042**                  0.7947***
##                                           (0.2301)                  (0.2405)
## CHAIR_WOM_DUMMY                            0.4908                    0.6516*
##                                           (0.2836)                  (0.2891)
## PROP_WOM x CHAIR_WOM_DUMMY                -1.161                    -1.681*
##                                           (0.7807)                  (0.8026)
## COMM_CHAIR_GRÜNE_DUMMY                   -0.2460*                  -0.1630
##                                           (0.1200)                  (0.1237)
## MINISTER_WOM_DUMMY                         0.0456                    0.0306
```

```
##                                        (0.0839)                (0.0838)
## MINISTER_GRÜNE_DUMMY                   0.0633                  0.1684
##                                        (0.0985)                (0.1060)
## LR_DUMMY                                0.1099                  0.1251
##                                        (0.1022)                (0.1020)
## AMENDMENT_DUMMY                        -0.0204                 -0.0034
##                                        (0.0764)                (0.0764)
## AVG_AGE_START                                                  -0.0376**
##                                                                (0.0143)
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY
##
## ------------------------ ------------------------ ------------------------
## Observations                              760                      760
## R2                                      0.02066                  0.02953
## RMSE                                     1.0220                   1.0174
##
##                                             5                        6
## Dependent Var.:           delta_total_dict_matches delta_total_dict_matches
##
## Constant                                 0.0656                  -0.1615
##                                         (0.1996)                 (0.1395)
## PROP_WOM                                 0.6051**                 0.6067**
##                                         (0.2299)                 (0.2315)
## CHAIR_WOM_DUMMY                          0.4972                   0.4842
##                                         (0.2834)                 (0.2908)
## PROP_WOM x CHAIR_WOM_DUMMY              -1.198                   -1.148
##                                         (0.7805)                 (0.7919)
## COMM_CHAIR_GRÜNE_DUMMY                  -0.2309                  -0.2452*
##                                         (0.1203)                 (0.1203)
## MINISTER_WOM_DUMMY                       0.0444                   0.0447
##                                         (0.0838)                 (0.0845)
## MINISTER_GRÜNE_DUMMY                    0.0551                   0.0643
##                                         (0.0986)                 (0.0990)
## LR_DUMMY                                 0.1050                   0.1104
##                                         (0.1022)                 (0.1024)
## AMENDMENT_DUMMY                         -0.0316                  -0.0199
##                                         (0.0767)                 (0.0766)
## AVG_AGE_START
##
## AVG_EDU                                 -0.1375
##                                         (0.0929)
## AVG_OCCEXP_BROAD_UMWELT                                           0.0495
##                                                                  (0.4798)
## EAST_DUMMY
##
## ------------------------ ------------------------ ------------------------
## Observations                              760                      760
## R2                                      0.02351                  0.02068
## RMSE                                     1.0206                   1.0220
##
```

```
##                                                7
## Dependent Var.:            delta_total_dict_matches
##
## Constant                                    -0.1922
##                                             (0.1342)
## PROP_WOM                                     0.5598*
##                                             (0.2325)
## CHAIR_WOM_DUMMY                              0.4752
##                                             (0.2837)
## PROP_WOM x CHAIR_WOM_DUMMY                  -1.102
##                                             (0.7816)
## COMM_CHAIR_GRÜNE_DUMMY                      -0.2239
##                                             (0.1211)
## MINISTER_WOM_DUMMY                           0.0352
##                                             (0.0842)
## MINISTER_GRÜNE_DUMMY                        0.0824
##                                             (0.0995)
## LR_DUMMY                                     0.1140
##                                             (0.1022)
## AMENDMENT_DUMMY                             -0.0032
##                                             (0.0775)
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY                                   0.1124
##                                             (0.0858)
## ------------------------- ------------------------
## Observations                                    760
## R2                                          0.02290
## RMSE                                         1.0209
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## MAE:
##      1      2      3      4      5      6      7
## 0.4303 0.4343 0.4514 0.4540 0.4534 0.4515 0.4541
```

```
cat("\nDelta (state FE)\n");     print_etable_clean(mods_del_state)
```

```
##
## Delta (state FE)

##                                                1                          2
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## PROP_WOM                                    -0.2125                   -0.0859
##                                             (0.2817)                  (0.3018)
## CHAIR_WOM_DUMMY                                                        0.4737
##                                                                       (0.3069)
## PROP_WOM x CHAIR_WOM_DUMMY                                            -0.8832
```

```
##                                                                 (0.8365)
## COMM_CHAIR_GRÜNE_DUMMY
##
## MINISTER_WOM_DUMMY
##
## MINISTER_GRÜNE_DUMMY
##
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## Fixed-Effects:             ----------------------- -----------------------
## state_code                                     Yes                     Yes
## -------------------------- ----------------------- -----------------------
## Observations                                   760                     760
## R2                                         0.05122                 0.05566
## RMSE                                        1.0060                  1.0036
##
##                                                 3                       4
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## PROP_WOM                                  -0.1062                  0.1589
##                                           (0.3074)                (0.3251)
## CHAIR_WOM_DUMMY                            0.3240                  0.4287
##                                           (0.3193)                (0.3211)
## PROP_WOM x CHAIR_WOM_DUMMY                -0.5002                 -0.9325
##                                           (0.8702)                (0.8852)
## COMM_CHAIR_GRÜNE_DUMMY                    -0.1720                 -0.0645
##                                           (0.1383)                (0.1447)
## MINISTER_WOM_DUMMY                         0.1550                  0.1644
##                                           (0.1078)                (0.1075)
## MINISTER_GRÜNE_DUMMY                      0.0379                  0.0923
##                                           (0.1143)                (0.1161)
## LR_DUMMY                                   0.1245                  0.1350
##                                           (0.1040)                (0.1038)
## AMENDMENT_DUMMY                            0.0101                  0.0214
##                                           (0.0782)                (0.0781)
## AVG_AGE_START                                                     -0.0441*
##                                                                   (0.0181)
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## Fixed-Effects:             ----------------------- -----------------------
## state_code                                     Yes                     Yes
## -------------------------- ----------------------- -----------------------
## Observations                                   760                     760
## R2                                         0.06100                 0.06851
```

```
## RMSE                                    1.0008                  0.99676
##
##                                            5                        6
## Dependent Var.:           delta_total_dict_matches delta_total_dict_matches
##
## PROP_WOM                                -0.1913                 -0.0871
##                                        (0.3086)                (0.3149)
## CHAIR_WOM_DUMMY                         0.3068                  0.3056
##                                        (0.3184)                (0.3261)
## PROP_WOM x CHAIR_WOM_DUMMY              -0.5550                 -0.4583
##                                        (0.8679)                (0.8832)
## COMM_CHAIR_GRÜNE_DUMMY                 -0.1701                 -0.1751
##                                        (0.1379)                (0.1388)
## MINISTER_WOM_DUMMY                      0.1488                  0.1543
##                                        (0.1075)                (0.1079)
## MINISTER_GRÜNE_DUMMY                   0.1109                  0.0386
##                                        (0.1183)                (0.1145)
## LR_DUMMY                                0.1250                  0.1251
##                                        (0.1037)                (0.1041)
## AMENDMENT_DUMMY                         0.0046                  0.0103
##                                        (0.0780)                (0.0783)
## AVG_AGE_START
##
## AVG_EDU                                -0.3171*
##                                        (0.1364)
## AVG_OCCEXP_BROAD_UMWELT                                         0.1623
##                                                                (0.5726)
## Fixed-Effects:            ----------------------- -----------------------
## state_code                                 Yes                     Yes
## ------------------------- ----------------------- -----------------------
## Observations                               760                     760
## R2                                     0.06784                 0.06110
## RMSE                                   0.99712                  1.0007
##
##                                            7
## Dependent Var.:           delta_total_dict_matches
##
## PROP_WOM                                -0.1062
##                                        (0.3074)
## CHAIR_WOM_DUMMY                         0.3240
##                                        (0.3193)
## PROP_WOM x CHAIR_WOM_DUMMY              -0.5002
##                                        (0.8702)
## COMM_CHAIR_GRÜNE_DUMMY                 -0.1720
##                                        (0.1383)
## MINISTER_WOM_DUMMY                      0.1550
##                                        (0.1078)
## MINISTER_GRÜNE_DUMMY                   0.0379
##                                        (0.1143)
## LR_DUMMY                                0.1245
##                                        (0.1040)
## AMENDMENT_DUMMY                         0.0101
##                                        (0.0782)
## AVG_AGE_START
```

```
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## Fixed-Effects:            ------------------------
## state_code                                     Yes
## __________________________ ________________________
## Observations                                   760
## R2                                         0.06100
## RMSE                                        1.0008
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## MAE:
##      1      2      3      4      5      6      7
## 0.4635 0.4708 0.4784 0.4779 0.4787 0.4780 0.4784
```

Here's a variation with SPD and LINKE vars to try to better cover the party ideology effect found in the literature Adding these to parties is motivated by the finding in Fetscher that women in the Landtagen are significantly associated with GRÜNE, SPD, and LINKE (pg. 21) It's a robustness check for the appendix

```r
rhs_steps <- list(
  c("PROP_WOM"),
  c("CHAIR_WOM_DUMMY"),
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM"),
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","COMM_CHAIR_SPD_DUM
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","COMM_CHAIR_SPD_DUM
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","COMM_CHAIR_SPD_DUM
  c("PROP_WOM","CHAIR_WOM_DUMMY","CHAIR_WOM_DUMMY:PROP_WOM","COMM_CHAIR_GRÜNE_DUMMY","COMM_CHAIR_SPD_DUM
)

build_formula <- function(dv, k, fe_mode = c("none","state")) {
  fe_mode <- match.arg(fe_mode)
  rhs <- paste(rhs_steps[[k]], collapse = " + ")
  if (fe_mode == "none") {
    as.formula(paste0(dv, " ~ ", rhs))
  } else {
    as.formula(paste0(dv, " ~ ", rhs, " | state_code"))
  }
}

run_series <- function(dv, fe_mode = c("none","state")) {
  fe_mode <- match.arg(fe_mode)
  mods <- vector("list", length(rhs_steps))
  for (k in seq_along(rhs_steps)) {
    fml <- build_formula(dv, k, fe_mode)
    mods[[k]] <- feols(fml, data = merged_df)
  }
  names(mods) <- paste0(seq_along(rhs_steps))
  mods
}

# Build series
```

```r
mods_cos_none  <- run_series("cosine_similarity", fe_mode = "none")
mods_cos_state <- run_series("cosine_similarity", fe_mode = "state")
```

```
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
```

```r
mods_del_none  <- run_series("delta_total_dict_matches", fe_mode = "none")
mods_del_state <- run_series("delta_total_dict_matches", fe_mode = "state")
```

```
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
## The variable 'EAST_DUMMY' has been removed because of collinearity (see
## $collin.var).
```

```r
# Metrics
mae_vec  <- function(models) sapply(models, function(m) mean(abs(residuals(m)), na.rm = TRUE))
rmse_vec <- function(models) sapply(models, function(m) sqrt(mean(residuals(m)^2, na.rm = TRUE)))


strip_se_type <- function(x) {
  lines <- strsplit(x, "\n", fixed = TRUE)[[1]]
  lines <- lines[!grepl("^S\\.E\\. type", lines)]
  paste(lines, collapse = "\n")
}

# Console preview; prints MAE/RMSE below
print_etable_clean <- function(models) {
  tbl_str <- capture.output(etable(models, se.below = TRUE, fitstat = c("n","r2","rmse")))
  cat(strip_se_type(paste(tbl_str, collapse = "\n")), "\n")
  cat("\nMAE:\n"); print(round(mae_vec(models), 4))
}

# Export using modelsummary (works for both LaTeX/HTML); adds RMSE and MAE rows
export_etable <- function(models, file_tex, file_html = NULL) {
  if (!requireNamespace("modelsummary", quietly = TRUE)) install.packages("modelsummary")
  library(modelsummary)

  ms_list <- models; names(ms_list) <- names(models)

  # Add RMSE and MAE rows
  mae_vals  <- round(mae_vec(models), 4)
  add_rows_df <- rbind(
    data.frame(term = "MAE",  t(mae_vals),  check.names = FALSE)
  )
  colnames(add_rows_df)[-1] <- names(models)
```

```
  # LaTeX
  modelsummary(
    ms_list,
    output   = file_tex,
    stars    = c("+"=.1,"*"=.05,"**"=.01,"***"=.001),
    gof_omit = "IC|Log|Adj|AIC|BIC",
    add_rows = add_rows_df
  )

  # HTML
  if (!is.null(file_html)) {
    modelsummary(
      ms_list,
      output   = file_html,
      stars    = c("+"=.1,"*"=.05,"**"=.01,"***"=.001),
      gof_omit = "IC|Log|Adj|AIC|BIC",
      add_rows = add_rows_df
    )
  }
  message("Wrote: ",
          normalizePath(file_tex, winslash = "\\"),
          if (!is.null(file_html)) paste0(" and ", normalizePath(file_html, winslash = "\\")) else "")
}

# Output dir
out_dir <- file.path(getwd(), "tables"); dir.create(out_dir, showWarnings = FALSE, recursive = TRUE)

# Write LaTeX + HTML
export_etable(mods_cos_none,
              file_tex  = file.path(out_dir, "S1_cosine_noFE_Linke_spd_7cols.tex"),
              file_html = file.path(out_dir, "S1_cosine_noFE_Linke_spd_7cols.html"))
```

```
## Wrote: \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\tables\S1_cosine_noFE_Linke_spd_7cols.te
```

```
export_etable(mods_cos_state,
              file_tex  = file.path(out_dir, "S2_cosine_stateFE_Linke_spd_7cols.tex"),
              file_html = file.path(out_dir, "S2_cosine_stateFE_Linke_spd_7cols.html"))
```

```
## Wrote: \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\tables\S2_cosine_stateFE_Linke_spd_7cols
```

```
export_etable(mods_del_none,
              file_tex  = file.path(out_dir, "S3_delta_noFE_Linke_spd_7cols.tex"),
              file_html = file.path(out_dir, "S3_delta_noFE_Linke_spd_7cols.html"))
```

```
## Wrote: \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\tables\S3_delta_noFE_Linke_spd_7cols.tex
```

```
export_etable(mods_del_state,
              file_tex  = file.path(out_dir, "S4_delta_stateFE_Linke_spd_7cols.tex"),
              file_html = file.path(out_dir, "S4_delta_stateFE_Linke_spd_7cols.html"))
```

```
## Wrote: \\ad.uni-hamburg.de\redir\redir0110\BBC9950\Documents\tables\S4_delta_stateFE_Linke_spd_7cols
```

```r
# Console previews
cat("\nCosine (no FE)\n");        print_etable_clean(mods_cos_none)
```

```
##
## Cosine (no FE)

##                                          1                 2
## Dependent Var.:            cosine_similarity cosine_similarity
##
## Constant                          0.8951***         0.9128***
##                                  (0.0096)          (0.0051)
## PROP_WOM                          0.0656*
##                                  (0.0267)
## CHAIR_WOM_DUMMY                                     0.0175
##                                                    (0.0120)
## PROP_WOM x CHAIR_WOM_DUMMY
##
## COMM_CHAIR_GRÜNE_DUMMY
##
## COMM_CHAIR_SPD_DUMMY
##
## COMM_CHAIR_LINKE_DUMMY
##
## MINISTER_WOM_DUMMY
##
## MINISTER_GRÜNE_DUMMY
##
## MINISTER_SPD_DUMMY
##
## MINISTER_LINKE_DUMMY
##
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## ------------------------ ----------------- -----------------
## Observations                           760               760
## R2                                 0.00789           0.00282
## RMSE                               0.12602           0.12634
##
##                                          3                 4
```

```
## Dependent Var.:            cosine_similarity cosine_similarity
##
## Constant                           0.8932***         0.7876***
##                                   (0.0101)          (0.0154)
## PROP_WOM                           0.0627*           0.0915***
##                                   (0.0281)          (0.0271)
## CHAIR_WOM_DUMMY                    0.0141           -0.0268
##                                   (0.0340)          (0.0337)
## PROP_WOM x CHAIR_WOM_DUMMY         0.0038            0.1205
##                                   (0.0931)          (0.0941)
## COMM_CHAIR_GRÜNE_DUMMY                              -0.0014
##                                                     (0.0143)
## COMM_CHAIR_SPD_DUMMY                                0.0187
##                                                     (0.0100)
## COMM_CHAIR_LINKE_DUMMY                              0.0078
##                                                     (0.0137)
## MINISTER_WOM_DUMMY                                  0.0097
##                                                     (0.0095)
## MINISTER_GRÜNE_DUMMY                               -0.0140
##                                                     (0.0117)
## MINISTER_SPD_DUMMY                                 -0.0256*
##                                                     (0.0108)
## MINISTER_LINKE_DUMMY                               -0.0771**
##                                                     (0.0249)
## LR_DUMMY                                            0.1357***
##                                                     (0.0113)
## AMENDMENT_DUMMY                                    -0.0249**
##                                                     (0.0085)
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## ------------------------- ----------------- -----------------
## Observations                            760               760
## R2                                  0.01007           0.21637
## RMSE                                0.12588           0.11200
##
##                                           5                 6
## Dependent Var.:            cosine_similarity cosine_similarity
##
## Constant                           0.6435***         0.6439***
##                                   (0.0777)          (0.0790)
## PROP_WOM                           0.0691*           0.0693*
##                                   (0.0298)          (0.0316)
## CHAIR_WOM_DUMMY                   -0.0388           -0.0388
##                                   (0.0352)          (0.0353)
```

```
## PROP_WOM x CHAIR_WOM_DUMMY         0.1469            0.1465
##                                   (0.0982)          (0.1002)
## COMM_CHAIR_GRÜNE_DUMMY           -0.0049           -0.0048
##                                   (0.0148)          (0.0150)
## COMM_CHAIR_SPD_DUMMY               0.0216*           0.0216*
##                                   (0.0101)          (0.0101)
## COMM_CHAIR_LINKE_DUMMY             0.0249            0.0250
##                                   (0.0165)          (0.0167)
## MINISTER_WOM_DUMMY                 0.0075            0.0075
##                                   (0.0096)          (0.0096)
## MINISTER_GRÜNE_DUMMY              -0.0237           -0.0236
##                                   (0.0125)          (0.0132)
## MINISTER_SPD_DUMMY                -0.0194           -0.0194
##                                   (0.0110)          (0.0110)
## MINISTER_LINKE_DUMMY              -0.0528*          -0.0527*
##                                   (0.0263)          (0.0264)
## LR_DUMMY                           0.1341***         0.1341***
##                                   (0.0112)          (0.0112)
## AMENDMENT_DUMMY                   -0.0272**         -0.0272**
##                                   (0.0085)          (0.0085)
## AVG_AGE_START                      0.0041*           0.0040*
##                                   (0.0016)          (0.0017)
## AVG_EDU                           -0.0281*          -0.0281*
##                                   (0.0135)          (0.0135)
## AVG_OCCEXP_BROAD_UMWELT            0.0290            0.0293
##                                   (0.0606)          (0.0623)
## EAST_DUMMY                        -0.0006           -0.0006
##                                   (0.0133)          (0.0134)
## ALIGN_CHAIR_MINISTER                                 0.0002
##                                                     (0.0099)
## PROP_WOM_IN_PARL
##
## ------------------------- ----------------- -----------------
## Observations                            760               760
## R2                                  0.22865           0.22865
## RMSE                                0.11112           0.11112
##
##                                           7
## Dependent Var.:            cosine_similarity
##
## Constant                           0.6444***
##                                   (0.0791)
## PROP_WOM                           0.0742
##                                   (0.0378)
## CHAIR_WOM_DUMMY                   -0.0386
##                                   (0.0354)
## PROP_WOM x CHAIR_WOM_DUMMY         0.1467
##                                   (0.1002)
## COMM_CHAIR_GRÜNE_DUMMY            -0.0041
##                                   (0.0154)
## COMM_CHAIR_SPD_DUMMY               0.0225*
##                                   (0.0107)
## COMM_CHAIR_LINKE_DUMMY             0.0252
##                                   (0.0168)
```

```
## MINISTER_WOM_DUMMY                 0.0082
##                                   (0.0102)
## MINISTER_GRÜNE_DUMMY              -0.0234
##                                   (0.0133)
## MINISTER_SPD_DUMMY                -0.0192
##                                   (0.0111)
## MINISTER_LINKE_DUMMY              -0.0528*
##                                   (0.0264)
## LR_DUMMY                           0.1341***
##                                   (0.0112)
## AMENDMENT_DUMMY                   -0.0273**
##                                   (0.0085)
## AVG_AGE_START                      0.0041*
##                                   (0.0017)
## AVG_EDU                           -0.0286*
##                                   (0.0137)
## AVG_OCCEXP_BROAD_UMWELT            0.0290
##                                   (0.0624)
## EAST_DUMMY                        4e-5
##                                   (0.0137)
## ALIGN_CHAIR_MINISTER              -0.0003
##                                   (0.0101)
## PROP_WOM_IN_PARL                  -0.0194
##                                   (0.0827)
## ------------------------- -----------------
## Observations                            760
## R2                                  0.22871
## RMSE                                0.11111
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## MAE:
##      1      2      3      4      5      6      7
## 0.0858 0.0861 0.0856 0.0755 0.0742 0.0742 0.0741
```

```
cat("\nCosine (state FE)\n");    print_etable_clean(mods_cos_state)
```

```
##
## Cosine (state FE)

##                                          1                 2
## Dependent Var.:           cosine_similarity cosine_similarity
##
## PROP_WOM                           0.1018**
##                                   (0.0338)
## CHAIR_WOM_DUMMY                                      0.0123
##                                                     (0.0135)
## PROP_WOM x CHAIR_WOM_DUMMY
##
## COMM_CHAIR_GRÜNE_DUMMY
##
## COMM_CHAIR_SPD_DUMMY
##
```

```
## COMM_CHAIR_LINKE_DUMMY
##
## MINISTER_WOM_DUMMY
##
## MINISTER_GRÜNE_DUMMY
##
## MINISTER_SPD_DUMMY
##
## MINISTER_LINKE_DUMMY
##
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## Fixed-Effects:             ----------------- -----------------
## state_code                               Yes               Yes
## ------------------------- ----------------- -----------------
## Observations                             760               760
## R2                                   0.09042           0.08035
## RMSE                                 0.12066           0.12133
##
##                                            3                 4
## Dependent Var.:            cosine_similarity cosine_similarity
##
## PROP_WOM                            0.0931*          0.1090**
##                                    (0.0362)         (0.0373)
## CHAIR_WOM_DUMMY                    -0.0120          -0.0126
##                                    (0.0369)         (0.0380)
## PROP_WOM x CHAIR_WOM_DUMMY          0.0743           0.0644
##                                    (0.1005)         (0.1051)
## COMM_CHAIR_GRÜNE_DUMMY                               0.0076
##                                                     (0.0160)
## COMM_CHAIR_SPD_DUMMY                                 0.0017
##                                                     (0.0119)
## COMM_CHAIR_LINKE_DUMMY                               0.0185
##                                                     (0.0190)
## MINISTER_WOM_DUMMY                                  -0.0007
##                                                     (0.0122)
## MINISTER_GRÜNE_DUMMY                                -0.0187
##                                                     (0.0130)
## MINISTER_SPD_DUMMY                                  -0.0275
##                                                     (0.0162)
## MINISTER_LINKE_DUMMY                                -0.0463
##                                                     (0.0315)
```

```
## LR_DUMMY                                          0.1269***
##                                                  (0.0114)
## AMENDMENT_DUMMY                                  -0.0273**
##                                                  (0.0085)
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## Fixed-Effects:             ----------------- -----------------
## state_code                               Yes               Yes
## -------------------------- ----------------- -----------------
## Observations                             760               760
## R2                                   0.09231           0.26050
## RMSE                                 0.12054           0.10880
##
##                                            5                 6
## Dependent Var.:            cosine_similarity cosine_similarity
##
## PROP_WOM                            0.0808*           0.0845*
##                                    (0.0408)          (0.0422)
## CHAIR_WOM_DUMMY                    -0.0198           -0.0188
##                                    (0.0387)          (0.0388)
## PROP_WOM x CHAIR_WOM_DUMMY          0.0935            0.0848
##                                    (0.1067)          (0.1095)
## COMM_CHAIR_GRÜNE_DUMMY             -0.0025           -0.0019
##                                    (0.0168)          (0.0169)
## COMM_CHAIR_SPD_DUMMY                0.0031            0.0027
##                                    (0.0121)          (0.0121)
## COMM_CHAIR_LINKE_DUMMY              0.0179            0.0186
##                                    (0.0192)          (0.0193)
## MINISTER_WOM_DUMMY                 -0.0025           -0.0030
##                                    (0.0122)          (0.0123)
## MINISTER_GRÜNE_DUMMY               -0.0217           -0.0204
##                                    (0.0134)          (0.0140)
## MINISTER_SPD_DUMMY                 -0.0260           -0.0270
##                                    (0.0172)          (0.0174)
## MINISTER_LINKE_DUMMY               -0.0364           -0.0362
##                                    (0.0324)          (0.0324)
## LR_DUMMY                            0.1257***         0.1257***
##                                    (0.0114)          (0.0114)
## AMENDMENT_DUMMY                    -0.0286***        -0.0287***
##                                    (0.0086)          (0.0086)
## AVG_AGE_START                       0.0040*           0.0039
##                                    (0.0020)          (0.0021)
## AVG_EDU                            -0.0065           -0.0071
##                                    (0.0166)          (0.0167)
## AVG_OCCEXP_BROAD_UMWELT            -0.0010            0.0043
##                                    (0.0675)          (0.0692)
```

```
## ALIGN_CHAIR_MINISTER                              0.0041
##                                                  (0.0115)
## PROP_WOM_IN_PARL
##
## Fixed-Effects:             ----------------- -----------------
## state_code                               Yes               Yes
## ------------------------- ----------------- -----------------
## Observations                             760               760
## R2                                   0.26443           0.26457
## RMSE                                 0.10851           0.10850
##
##                                            7
## Dependent Var.:            cosine_similarity
##
## PROP_WOM                            0.0559
##                                    (0.0481)
## CHAIR_WOM_DUMMY                    -0.0150
##                                    (0.0389)
## PROP_WOM x CHAIR_WOM_DUMMY          0.0798
##                                    (0.1095)
## COMM_CHAIR_GRÜNE_DUMMY             -0.0048
##                                    (0.0170)
## COMM_CHAIR_SPD_DUMMY               -0.0038
##                                    (0.0132)
## COMM_CHAIR_LINKE_DUMMY              0.0163
##                                    (0.0194)
## MINISTER_WOM_DUMMY                 -0.0071
##                                    (0.0127)
## MINISTER_GRÜNE_DUMMY               -0.0212
##                                    (0.0140)
## MINISTER_SPD_DUMMY                 -0.0263
##                                    (0.0174)
## MINISTER_LINKE_DUMMY               -0.0384
##                                    (0.0324)
## LR_DUMMY                            0.1252***
##                                    (0.0114)
## AMENDMENT_DUMMY                    -0.0288***
##                                    (0.0086)
## AVG_AGE_START                       0.0030
##                                    (0.0022)
## AVG_EDU                            -0.0012
##                                    (0.0174)
## AVG_OCCEXP_BROAD_UMWELT            -0.0037
##                                    (0.0695)
## ALIGN_CHAIR_MINISTER                0.0033
##                                    (0.0115)
## PROP_WOM_IN_PARL                    0.1470
##                                    (0.1188)
## Fixed-Effects:             -----------------
## state_code                               Yes
## ------------------------- -----------------
## Observations                             760
## R2                                   0.26611
## RMSE                                 0.10839
```

```
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## MAE:
##      1      2      3      4      5      6      7
## 0.0804 0.0811 0.0803 0.0728 0.0723 0.0724 0.0724
```

```
cat("\nDelta (no FE)\n");        print_etable_clean(mods_del_none)
```

```
##
## Delta (no FE)

##                                              1                         2
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## Constant                                  -0.0262                    0.1090**
##                                           (0.0788)                  (0.0414)
## PROP_WOM                                   0.4840*
##                                           (0.2183)
## CHAIR_WOM_DUMMY                                                      0.1043
##                                                                     (0.0978)
## PROP_WOM x CHAIR_WOM_DUMMY
##
## COMM_CHAIR_GRÜNE_DUMMY
##
## COMM_CHAIR_SPD_DUMMY
##
## COMM_CHAIR_LINKE_DUMMY
##
## MINISTER_WOM_DUMMY
##
## MINISTER_GRÜNE_DUMMY
##
## MINISTER_SPD_DUMMY
##
## MINISTER_LINKE_DUMMY
##
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
```

```
## ------------------------- ----------------------- -----------------------
## Observations                                  760                     760
## R2                                        0.00644                 0.00150
## RMSE                                       1.0294                  1.0320
##
##                                                 3                       4
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## Constant                                  -0.0810                 -0.2437
##                                           (0.0825)                (0.1399)
## PROP_WOM                                   0.6090**                0.6535**
##                                           (0.2292)                (0.2470)
## CHAIR_WOM_DUMMY                            0.6133*                 0.4576
##                                           (0.2774)                (0.3068)
## PROP_WOM x CHAIR_WOM_DUMMY                -1.534*                 -1.053
##                                           (0.7593)                (0.8561)
## COMM_CHAIR_GRÜNE_DUMMY                                            -0.1702
##                                                                   (0.1301)
## COMM_CHAIR_SPD_DUMMY                                               0.0236
##                                                                   (0.0911)
## COMM_CHAIR_LINKE_DUMMY                                             0.2179
##                                                                   (0.1247)
## MINISTER_WOM_DUMMY                                                 0.0220
##                                                                   (0.0867)
## MINISTER_GRÜNE_DUMMY                                              0.0672
##                                                                   (0.1069)
## MINISTER_SPD_DUMMY                                                 0.0875
##                                                                   (0.0980)
## MINISTER_LINKE_DUMMY                                              -0.0940
##                                                                   (0.2267)
## LR_DUMMY                                                           0.1218
##                                                                   (0.1025)
## AMENDMENT_DUMMY                                                   -0.0013
##                                                                   (0.0773)
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## EAST_DUMMY
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## ------------------------- ----------------------- -----------------------
## Observations                                  760                     760
## R2                                        0.01285                 0.02598
## RMSE                                       1.0261                  1.0193
##
##                                                 5                       6
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
```

```
## Constant                                    1.817*                  1.898**
##                                            (0.7056)                (0.7172)
## PROP_WOM                                    0.8094**                0.8698**
##                                            (0.2704)                (0.2870)
## CHAIR_WOM_DUMMY                             0.5846                  0.6004
##                                            (0.3199)                (0.3210)
## PROP_WOM x CHAIR_WOM_DUMMY                 -1.579                  -1.689
##                                            (0.8925)                (0.9097)
## COMM_CHAIR_GRÜNE_DUMMY                     -0.0326                 -0.0186
##                                            (0.1347)                (0.1365)
## COMM_CHAIR_SPD_DUMMY                        0.0162                  0.0187
##                                            (0.0914)                (0.0915)
## COMM_CHAIR_LINKE_DUMMY                      0.2550                  0.2696
##                                            (0.1501)                (0.1519)
## MINISTER_WOM_DUMMY                         -0.0214                 -0.0200
##                                            (0.0876)                (0.0876)
## MINISTER_GRÜNE_DUMMY                       0.1752                  0.2004
##                                            (0.1133)                (0.1202)
## MINISTER_SPD_DUMMY                          0.0751                  0.0794
##                                            (0.0996)                (0.0999)
## MINISTER_LINKE_DUMMY                       -0.0051                  0.0097
##                                            (0.2386)                (0.2399)
## LR_DUMMY                                    0.1345                  0.1334
##                                            (0.1020)                (0.1021)
## AMENDMENT_DUMMY                             0.0112                  0.0090
##                                            (0.0774)                (0.0775)
## AVG_AGE_START                              -0.0350*                -0.0375*
##                                            (0.0149)                (0.0155)
## AVG_EDU                                    -0.3622**               -0.3668**
##                                            (0.1223)                (0.1226)
## AVG_OCCEXP_BROAD_UMWELT                     0.5325                  0.6143
##                                            (0.5506)                (0.5659)
## EAST_DUMMY                                  0.1219                  0.1149
##                                            (0.1211)                (0.1216)
## ALIGN_CHAIR_MINISTER                                                0.0567
##                                                                    (0.0900)
## PROP_WOM_IN_PARL
##
## ------------------------- ------------------------ ------------------------
## Observations                              760                      760
## R2                                      0.04467                  0.04518
## RMSE                                     1.0094                   1.0092
##
##                                             7
## Dependent Var.:            delta_total_dict_matches
##
## Constant                                    1.881**
##                                            (0.7178)
## PROP_WOM                                    0.7251*
##                                            (0.3433)
## CHAIR_WOM_DUMMY                             0.5955
##                                            (0.3211)
## PROP_WOM x CHAIR_WOM_DUMMY                 -1.696
##                                            (0.9100)
```

```
## COMM_CHAIR_GRÜNE_DUMMY                    -0.0407
##                                            (0.1396)
## COMM_CHAIR_SPD_DUMMY                       -0.0073
##                                            (0.0976)
## COMM_CHAIR_LINKE_DUMMY                      0.2629
##                                            (0.1522)
## MINISTER_WOM_DUMMY                         -0.0428
##                                            (0.0925)
## MINISTER_GRÜNE_DUMMY                       0.1923
##                                            (0.1207)
## MINISTER_SPD_DUMMY                          0.0730
##                                            (0.1003)
## MINISTER_LINKE_DUMMY                        0.0130
##                                            (0.2400)
## LR_DUMMY                                    0.1335
##                                            (0.1021)
## AMENDMENT_DUMMY                             0.0096
##                                            (0.0775)
## AVG_AGE_START                              -0.0397*
##                                            (0.0158)
## AVG_EDU                                    -0.3522**
##                                            (0.1241)
## AVG_OCCEXP_BROAD_UMWELT                     0.6229
##                                            (0.5662)
## EAST_DUMMY                                  0.0958
##                                            (0.1242)
## ALIGN_CHAIR_MINISTER                        0.0718
##                                            (0.0922)
## PROP_WOM_IN_PARL                            0.5770
##                                            (0.7510)
## ------------------------- ------------------------
## Observations                                  760
## R2                                          0.04594
## RMSE                                         1.0088
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## MAE:
##      1      2      3      4      5      6      7
## 0.4303 0.4294 0.4343 0.4584 0.4616 0.4637 0.4635
```

```
cat("\nDelta (state FE)\n");     print_etable_clean(mods_del_state)
```

```
##
## Delta (state FE)

##                                                 1                          2
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## PROP_WOM                                   -0.2125
##                                            (0.2817)
## CHAIR_WOM_DUMMY                                                       0.1740
##                                                                      (0.1114)
```

```
## PROP_WOM x CHAIR_WOM_DUMMY
##
## COMM_CHAIR_GRÜNE_DUMMY
##
## COMM_CHAIR_SPD_DUMMY
##
## COMM_CHAIR_LINKE_DUMMY
##
## MINISTER_WOM_DUMMY
##
## MINISTER_GRÜNE_DUMMY
##
## MINISTER_SPD_DUMMY
##
## MINISTER_LINKE_DUMMY
##
## LR_DUMMY
##
## AMENDMENT_DUMMY
##
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## Fixed-Effects:             ------------------------ ------------------------
## state_code                                      Yes                      Yes
## -------------------------- ------------------------ ------------------------
## Observations                                    760                      760
## R2                                          0.05122                  0.05360
## RMSE                                         1.0060                   1.0047
##
##                                                 3                        4
## Dependent Var.:            delta_total_dict_matches delta_total_dict_matches
##
## PROP_WOM                                   -0.0859                   0.0168
##                                            (0.3018)                 (0.3422)
## CHAIR_WOM_DUMMY                             0.4737                   0.2727
##                                            (0.3069)                 (0.3485)
## PROP_WOM x CHAIR_WOM_DUMMY                 -0.8832                  -0.2971
##                                            (0.8365)                 (0.9631)
## COMM_CHAIR_GRÜNE_DUMMY                                             -0.0632
##                                                                    (0.1464)
## COMM_CHAIR_SPD_DUMMY                                                0.1360
##                                                                    (0.1093)
## COMM_CHAIR_LINKE_DUMMY                                              0.1573
##                                                                    (0.1738)
## MINISTER_WOM_DUMMY                                                  0.1430
##                                                                    (0.1114)
```

```
## MINISTER_GRÜNE_DUMMY                                          0.0372
##                                                              (0.1190)
## MINISTER_SPD_DUMMY                                            0.2724
##                                                              (0.1483)
## MINISTER_LINKE_DUMMY                                          0.0283
##                                                              (0.2884)
## LR_DUMMY                                                      0.1232
##                                                              (0.1043)
## AMENDMENT_DUMMY                                               0.0090
##                                                              (0.0783)
## AVG_AGE_START
##
## AVG_EDU
##
## AVG_OCCEXP_BROAD_UMWELT
##
## ALIGN_CHAIR_MINISTER
##
## PROP_WOM_IN_PARL
##
## Fixed-Effects:            ---------------------- ----------------------
## state_code                                   Yes                    Yes
## ------------------------- ---------------------- ----------------------
## Observations                                 760                    760
## R2                                       0.05566                0.06797
## RMSE                                      1.0036                 0.99705
##
##                                               5                      6
## Dependent Var.:           delta_total_dict_matches delta_total_dict_matches
##
## PROP_WOM                                  0.3748                 0.2967
##                                          (0.3726)               (0.3845)
## CHAIR_WOM_DUMMY                           0.2297                 0.2091
##                                          (0.3532)               (0.3542)
## PROP_WOM x CHAIR_WOM_DUMMY               -0.4567                -0.2752
##                                          (0.9737)               (0.9985)
## COMM_CHAIR_GRÜNE_DUMMY                   0.0144                 0.0018
##                                          (0.1530)               (0.1538)
## COMM_CHAIR_SPD_DUMMY                      0.1545                 0.1617
##                                          (0.1101)               (0.1104)
## COMM_CHAIR_LINKE_DUMMY                    0.2365                 0.2226
##                                          (0.1752)               (0.1761)
## MINISTER_WOM_DUMMY                        0.1460                 0.1556
##                                          (0.1115)               (0.1121)
## MINISTER_GRÜNE_DUMMY                     0.1370                 0.1087
##                                          (0.1225)               (0.1272)
## MINISTER_SPD_DUMMY                        0.2029                 0.2237
##                                          (0.1570)               (0.1591)
## MINISTER_LINKE_DUMMY                     -0.0429                -0.0474
##                                          (0.2954)               (0.2956)
## LR_DUMMY                                  0.1353                 0.1351
##                                          (0.1039)               (0.1039)
## AMENDMENT_DUMMY                           0.0185                 0.0194
##                                          (0.0781)               (0.0781)
```

```
## AVG_AGE_START                              -0.0408*                 -0.0371
##                                            (0.0187)                 (0.0192)
## AVG_EDU                                    -0.2947                  -0.2821
##                                            (0.1518)                 (0.1526)
## AVG_OCCEXP_BROAD_UMWELT                     0.9568                   0.8446
##                                            (0.6162)                 (0.6311)
## ALIGN_CHAIR_MINISTER                                                -0.0863
##                                                                     (0.1046)
## PROP_WOM_IN_PARL
##
## Fixed-Effects:             ------------------------ ------------------------
## state_code                                     Yes                      Yes
## -------------------------- ------------------------ ------------------------
## Observations                                   760                      760
## R2                                         0.08132                  0.08217
## RMSE                                       0.98988                  0.98942
##
##                                                  7
## Dependent Var.:            delta_total_dict_matches
##
## PROP_WOM                                   0.2901
##                                           (0.4389)
## CHAIR_WOM_DUMMY                            0.2100
##                                           (0.3556)
## PROP_WOM x CHAIR_WOM_DUMMY                -0.2763
##                                           (0.9998)
## COMM_CHAIR_GRÜNE_DUMMY                    0.0011
##                                           (0.1554)
## COMM_CHAIR_SPD_DUMMY                       0.1602
##                                           (0.1206)
## COMM_CHAIR_LINKE_DUMMY                     0.2221
##                                           (0.1770)
## MINISTER_WOM_DUMMY                         0.1547
##                                           (0.1162)
## MINISTER_GRÜNE_DUMMY                      0.1085
##                                           (0.1274)
## MINISTER_SPD_DUMMY                         0.2238
##                                           (0.1593)
## MINISTER_LINKE_DUMMY                      -0.0479
##                                           (0.2962)
## LR_DUMMY                                   0.1350
##                                           (0.1041)
## AMENDMENT_DUMMY                            0.0194
##                                           (0.0782)
## AVG_AGE_START                             -0.0373
##                                           (0.0202)
## AVG_EDU                                   -0.2807
##                                           (0.1588)
## AVG_OCCEXP_BROAD_UMWELT                    0.8428
##                                           (0.6344)
## ALIGN_CHAIR_MINISTER                      -0.0865
##                                           (0.1048)
## PROP_WOM_IN_PARL                           0.0337
##                                           (1.084)
```

```
## Fixed-Effects:             ------------------------
## state_code                                     Yes
## -------------------------- ------------------------
## Observations                                   760
## R2                                         0.08218
## RMSE                                       0.98942
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## MAE:
##      1      2      3      4      5      6      7
## 0.4635 0.4718 0.4708 0.4795 0.4733 0.4724 0.4725
```

— Correlation and Variance Inflation Factor Tests —

Correlation matrix

```r
predictor_vars <- c(
  "PROP_WOM","PROP_WOM_IN_PARL","LR_DUMMY","AMENDMENT_DUMMY","CHAIR_WOM_DUMMY","MINISTER_WOM_DUMMY",
  "MINISTER_GRÜNE_DUMMY","MINISTER_CDUCSU_DUMMY","MINISTER_SPD_DUMMY","MINISTER_LINKE_DUMMY",
  "MINISTER_OTHER_DUMMY","GRÜNE_in_REG","CDUCSU_in_REG","SPD_in_REG","FDP_in_REG","LINKE_in_REG",
  "COMM_CHAIR_GRÜNE_DUMMY","COMM_CHAIR_CDUCSU_DUMMY","COMM_CHAIR_SPD_DUMMY","COMM_CHAIR_LINKE_DUMMY",
  "COMM_CHAIR_OTHER_DUMMY","PROP_CDUCSU","PROP_FDP","PROP_GRÜNE","PROP_SPD","PROP_LINKE","PROP_OTHER",
  "AVG_AGE_START","AVG_OCCEXP_BROAD_UMWELT","AVG_EDU","EAST_DUMMY"
)
cor_matrix <- cor(merged_df[, predictor_vars], use = "pairwise.complete.obs")
print(round(cor_matrix, 2))
```

```
##                          PROP_WOM PROP_WOM_IN_PARL LR_DUMMY AMENDMENT_DUMMY
## PROP_WOM                     1.00             0.64     0.01            0.03
## PROP_WOM_IN_PARL             0.64             1.00     0.01            0.00
## LR_DUMMY                     0.01             0.01     1.00           -0.20
## AMENDMENT_DUMMY              0.03             0.00    -0.20            1.00
## CHAIR_WOM_DUMMY              0.07             0.18     0.04            0.03
## MINISTER_WOM_DUMMY          -0.02             0.26    -0.08            0.05
## MINISTER_GRÜNE_DUMMY         0.08             0.21     0.02            0.05
## MINISTER_CDUCSU_DUMMY       -0.24            -0.36     0.05           -0.04
## MINISTER_SPD_DUMMY           0.11             0.12    -0.05            0.00
## MINISTER_LINKE_DUMMY         0.31             0.23     0.01            0.01
## MINISTER_OTHER_DUMMY         0.00             0.05    -0.08           -0.02
## GRÜNE_in_REG                 0.03             0.19     0.02            0.03
## CDUCSU_in_REG               -0.11            -0.31     0.05           -0.03
## SPD_in_REG                   0.19             0.37    -0.05            0.02
## FDP_in_REG                  -0.08            -0.03    -0.04            0.02
## LINKE_in_REG                 0.29             0.30     0.01           -0.02
## COMM_CHAIR_GRÜNE_DUMMY       0.09             0.18     0.01            0.05
## COMM_CHAIR_CDUCSU_DUMMY     -0.09            -0.29    -0.03            0.07
## COMM_CHAIR_SPD_DUMMY         0.00             0.21     0.05           -0.05
## COMM_CHAIR_LINKE_DUMMY      -0.16            -0.02    -0.04           -0.13
## COMM_CHAIR_OTHER_DUMMY       0.07             0.04    -0.01            0.03
## PROP_CDUCSU                 -0.30            -0.55     0.05            0.04
## PROP_FDP                    -0.03             0.08    -0.03           -0.03
```

```
## PROP_GRÜNE                -0.11            0.08    -0.01            0.01
## PROP_SPD                   0.06            0.18    -0.01            0.02
## PROP_LINKE                 0.38            0.37     0.01           -0.05
## PROP_OTHER                 0.03            0.08    -0.06           -0.03
## AVG_AGE_START              0.26            0.27     0.05            0.10
## AVG_OCCEXP_BROAD_UMWELT   -0.16           -0.04    -0.04           -0.04
## AVG_EDU                   -0.01           -0.02    -0.01           -0.09
## EAST_DUMMY                 0.10            0.16    -0.01           -0.17
##                       CHAIR_WOM_DUMMY MINISTER_WOM_DUMMY MINISTER_GRÜNE_DUMMY
## PROP_WOM                         0.07              -0.02                 0.08
## PROP_WOM_IN_PARL                 0.18               0.26                 0.21
## LR_DUMMY                         0.04              -0.08                 0.02
## AMENDMENT_DUMMY                  0.03               0.05                 0.05
## CHAIR_WOM_DUMMY                  1.00               0.18                 0.22
## MINISTER_WOM_DUMMY               0.18               1.00                 0.07
## MINISTER_GRÜNE_DUMMY             0.22               0.07                 1.00
## MINISTER_CDUCSU_DUMMY           -0.17              -0.13                -0.44
## MINISTER_SPD_DUMMY              -0.04               0.11                -0.27
## MINISTER_LINKE_DUMMY             0.18               0.15                -0.10
## MINISTER_OTHER_DUMMY            -0.05              -0.05                -0.13
## GRÜNE_in_REG                     0.20               0.05                 0.97
## CDUCSU_in_REG                   -0.22              -0.26                -0.41
## SPD_in_REG                       0.07               0.15                 0.24
## FDP_in_REG                       0.02               0.19                -0.19
## LINKE_in_REG                     0.11               0.22                 0.05
## COMM_CHAIR_GRÜNE_DUMMY           0.16               0.18                 0.05
## COMM_CHAIR_CDUCSU_DUMMY         -0.17              -0.18                 0.04
## COMM_CHAIR_SPD_DUMMY             0.11              -0.08                 0.03
## COMM_CHAIR_LINKE_DUMMY          -0.02               0.08                 0.06
## COMM_CHAIR_OTHER_DUMMY          -0.05               0.25                -0.03
## PROP_CDUCSU                     -0.10              -0.20                -0.31
## PROP_FDP                        -0.12               0.14                -0.03
## PROP_GRÜNE                       0.07               0.03                 0.57
## PROP_SPD                         0.28               0.00                 0.07
## PROP_LINKE                       0.03               0.10                -0.14
## PROP_OTHER                      -0.25               0.10                 0.21
## AVG_AGE_START                    0.07              -0.01                 0.38
## AVG_OCCEXP_BROAD_UMWELT          0.16               0.12                -0.05
## AVG_EDU                         -0.05              -0.01                -0.07
## EAST_DUMMY                      -0.07               0.04                -0.15
##                       MINISTER_CDUCSU_DUMMY MINISTER_SPD_DUMMY
## PROP_WOM                              -0.24               0.11
## PROP_WOM_IN_PARL                      -0.36               0.12
## LR_DUMMY                               0.05              -0.05
## AMENDMENT_DUMMY                       -0.04               0.00
## CHAIR_WOM_DUMMY                       -0.17              -0.04
## MINISTER_WOM_DUMMY                    -0.13               0.11
## MINISTER_GRÜNE_DUMMY                  -0.44              -0.27
## MINISTER_CDUCSU_DUMMY                  1.00              -0.54
## MINISTER_SPD_DUMMY                    -0.54               1.00
## MINISTER_LINKE_DUMMY                  -0.21              -0.12
## MINISTER_OTHER_DUMMY                  -0.26              -0.01
## GRÜNE_in_REG                          -0.46              -0.21
## CDUCSU_in_REG                          0.70              -0.36
```

```
## SPD_in_REG                          -0.69              0.56
## FDP_in_REG                           0.12             -0.06
## LINKE_in_REG                        -0.26             -0.11
## COMM_CHAIR_GRÜNE_DUMMY              -0.01             -0.21
## COMM_CHAIR_CDUCSU_DUMMY              0.12              0.00
## COMM_CHAIR_SPD_DUMMY                -0.13              0.09
## COMM_CHAIR_LINKE_DUMMY              -0.11              0.00
## COMM_CHAIR_OTHER_DUMMY               0.05              0.05
## PROP_CDUCSU                          0.71             -0.43
## PROP_FDP                             0.13             -0.13
## PROP_GRÜNE                          -0.24             -0.19
## PROP_SPD                            -0.55              0.55
## PROP_LINKE                          -0.16              0.17
## PROP_OTHER                          -0.13             -0.04
## AVG_AGE_START                       -0.03             -0.19
## AVG_OCCEXP_BROAD_UMWELT              0.08              0.01
## AVG_EDU                             -0.09              0.04
## EAST_DUMMY                          -0.11              0.19
##                       MINISTER_LINKE_DUMMY MINISTER_OTHER_DUMMY GRÜNE_in_REG
## PROP_WOM                              0.31                0.00         0.03
## PROP_WOM_IN_PARL                      0.23                0.05         0.19
## LR_DUMMY                              0.01               -0.08         0.02
## AMENDMENT_DUMMY                       0.01               -0.02         0.03
## CHAIR_WOM_DUMMY                       0.18               -0.05         0.20
## MINISTER_WOM_DUMMY                    0.15               -0.05         0.05
## MINISTER_GRÜNE_DUMMY                 -0.10               -0.13         0.97
## MINISTER_CDUCSU_DUMMY                -0.21               -0.26        -0.46
## MINISTER_SPD_DUMMY                   -0.12               -0.01        -0.21
## MINISTER_LINKE_DUMMY                  1.00               -0.06        -0.11
## MINISTER_OTHER_DUMMY                 -0.06                1.00        -0.13
## GRÜNE_in_REG                         -0.11               -0.13         1.00
## CDUCSU_in_REG                        -0.30                0.01        -0.43
## SPD_in_REG                            0.22               -0.09         0.26
## FDP_in_REG                           -0.13                0.24        -0.15
## LINKE_in_REG                          0.82               -0.07         0.04
## COMM_CHAIR_GRÜNE_DUMMY                0.32                0.06         0.03
## COMM_CHAIR_CDUCSU_DUMMY              -0.20               -0.09         0.01
## COMM_CHAIR_SPD_DUMMY                 -0.05                0.05         0.01
## COMM_CHAIR_LINKE_DUMMY                0.06                0.04         0.13
## COMM_CHAIR_OTHER_DUMMY               -0.08               -0.10        -0.04
## PROP_CDUCSU                          -0.23               -0.05        -0.32
## PROP_FDP                              0.01               -0.02         0.03
## PROP_GRÜNE                           -0.10               -0.08         0.59
## PROP_SPD                             -0.02                0.19         0.07
## PROP_LINKE                            0.43               -0.15        -0.15
## PROP_OTHER                           -0.12                0.10         0.19
## AVG_AGE_START                        -0.08               -0.14         0.31
## AVG_OCCEXP_BROAD_UMWELT              -0.05               -0.07         0.03
## AVG_EDU                               0.25               -0.15        -0.03
## EAST_DUMMY                            0.19               -0.08        -0.10
##                       CDUCSU_in_REG SPD_in_REG FDP_in_REG LINKE_in_REG
## PROP_WOM                      -0.11       0.19      -0.08         0.29
## PROP_WOM_IN_PARL              -0.31       0.37      -0.03         0.30
## LR_DUMMY                       0.05      -0.05      -0.04         0.01
```

```
## AMENDMENT_DUMMY                -0.03       0.02       0.02        -0.02
## CHAIR_WOM_DUMMY                -0.22       0.07       0.02         0.11
## MINISTER_WOM_DUMMY             -0.26       0.15       0.19         0.22
## MINISTER_GRÜNE_DUMMY           -0.41       0.24      -0.19         0.05
## MINISTER_CDUCSU_DUMMY           0.70      -0.69       0.12        -0.26
## MINISTER_SPD_DUMMY             -0.36       0.56      -0.06        -0.11
## MINISTER_LINKE_DUMMY           -0.30       0.22      -0.13         0.82
## MINISTER_OTHER_DUMMY            0.01      -0.09       0.24        -0.07
## GRÜNE_in_REG                   -0.43       0.26      -0.15         0.04
## CDUCSU_in_REG                   1.00      -0.73       0.20        -0.37
## SPD_in_REG                     -0.73       1.00      -0.38         0.27
## FDP_in_REG                      0.20      -0.38       1.00        -0.17
## LINKE_in_REG                   -0.37       0.27      -0.17         1.00
## COMM_CHAIR_GRÜNE_DUMMY          0.10      -0.20       0.04         0.24
## COMM_CHAIR_CDUCSU_DUMMY         0.04      -0.01      -0.21        -0.24
## COMM_CHAIR_SPD_DUMMY           -0.12       0.11      -0.05        -0.09
## COMM_CHAIR_LINKE_DUMMY         -0.09       0.16      -0.01         0.29
## COMM_CHAIR_OTHER_DUMMY          0.04       0.02       0.30        -0.10
## PROP_CDUCSU                     0.50      -0.68       0.09        -0.27
## PROP_FDP                       -0.03      -0.06       0.44        -0.08
## PROP_GRÜNE                     -0.26       0.15       0.03        -0.04
## PROP_SPD                       -0.51       0.42      -0.20        -0.09
## PROP_LINKE                     -0.02       0.29      -0.19         0.41
## PROP_OTHER                      0.09       0.13       0.08         0.10
## AVG_AGE_START                   0.12      -0.06       0.15        -0.10
## AVG_OCCEXP_BROAD_UMWELT         0.00       0.06       0.30        -0.11
## AVG_EDU                         0.11       0.09      -0.07         0.22
## EAST_DUMMY                      0.04       0.31      -0.14         0.26
##                        COMM_CHAIR_GRÜNE_DUMMY COMM_CHAIR_CDUCSU_DUMMY
## PROP_WOM                                0.09                    -0.09
## PROP_WOM_IN_PARL                        0.18                    -0.29
## LR_DUMMY                                0.01                    -0.03
## AMENDMENT_DUMMY                         0.05                     0.07
## CHAIR_WOM_DUMMY                         0.16                    -0.17
## MINISTER_WOM_DUMMY                      0.18                    -0.18
## MINISTER_GRÜNE_DUMMY                    0.05                     0.04
## MINISTER_CDUCSU_DUMMY                  -0.01                     0.12
## MINISTER_SPD_DUMMY                     -0.21                     0.00
## MINISTER_LINKE_DUMMY                    0.32                    -0.20
## MINISTER_OTHER_DUMMY                    0.06                    -0.09
## GRÜNE_in_REG                            0.03                     0.01
## CDUCSU_in_REG                           0.10                     0.04
## SPD_in_REG                             -0.20                    -0.01
## FDP_in_REG                              0.04                    -0.21
## LINKE_in_REG                            0.24                    -0.24
## COMM_CHAIR_GRÜNE_DUMMY                  1.00                    -0.29
## COMM_CHAIR_CDUCSU_DUMMY                -0.29                     1.00
## COMM_CHAIR_SPD_DUMMY                   -0.23                    -0.33
## COMM_CHAIR_LINKE_DUMMY                 -0.14                    -0.33
## COMM_CHAIR_OTHER_DUMMY                 -0.14                    -0.33
## PROP_CDUCSU                             0.04                     0.05
## PROP_FDP                                0.02                     0.13
## PROP_GRÜNE                              0.03                     0.03
## PROP_SPD                               -0.10                     0.05
```

```
## PROP_LINKE                              0.08                  -0.08
## PROP_OTHER                             -0.07                  -0.16
## AVG_AGE_START                           0.21                   0.10
## AVG_OCCEXP_BROAD_UMWELT                -0.07                  -0.08
## AVG_EDU                                 0.06                  -0.21
## EAST_DUMMY                             -0.15                  -0.19
##                         COMM_CHAIR_SPD_DUMMY COMM_CHAIR_LINKE_DUMMY
## PROP_WOM                                0.00                  -0.16
## PROP_WOM_IN_PARL                        0.21                  -0.02
## LR_DUMMY                                0.05                  -0.04
## AMENDMENT_DUMMY                        -0.05                  -0.13
## CHAIR_WOM_DUMMY                         0.11                  -0.02
## MINISTER_WOM_DUMMY                     -0.08                   0.08
## MINISTER_GRÜNE_DUMMY                    0.03                   0.06
## MINISTER_CDUCSU_DUMMY                  -0.13                  -0.11
## MINISTER_SPD_DUMMY                      0.09                   0.00
## MINISTER_LINKE_DUMMY                   -0.05                   0.06
## MINISTER_OTHER_DUMMY                    0.05                   0.04
## GRÜNE_in_REG                            0.01                   0.13
## CDUCSU_in_REG                          -0.12                  -0.09
## SPD_in_REG                              0.11                   0.16
## FDP_in_REG                             -0.05                  -0.01
## LINKE_in_REG                           -0.09                   0.29
## COMM_CHAIR_GRÜNE_DUMMY                 -0.23                  -0.14
## COMM_CHAIR_CDUCSU_DUMMY                -0.33                  -0.33
## COMM_CHAIR_SPD_DUMMY                    1.00                  -0.07
## COMM_CHAIR_LINKE_DUMMY                 -0.07                   1.00
## COMM_CHAIR_OTHER_DUMMY                 -0.22                  -0.13
## PROP_CDUCSU                            -0.12                  -0.12
## PROP_FDP                               -0.03                  -0.08
## PROP_GRÜNE                             -0.11                   0.03
## PROP_SPD                                0.25                  -0.10
## PROP_LINKE                              0.03                   0.08
## PROP_OTHER                             -0.08                   0.26
## AVG_AGE_START                          -0.06                  -0.17
## AVG_OCCEXP_BROAD_UMWELT                -0.04                   0.18
## AVG_EDU                                -0.01                   0.40
## EAST_DUMMY                              0.04                   0.53
##                         COMM_CHAIR_OTHER_DUMMY PROP_CDUCSU PROP_FDP PROP_GRÜNE
## PROP_WOM                                 0.07       -0.30    -0.03      -0.11
## PROP_WOM_IN_PARL                         0.04       -0.55     0.08       0.08
## LR_DUMMY                                -0.01        0.05    -0.03      -0.01
## AMENDMENT_DUMMY                          0.03        0.04    -0.03       0.01
## CHAIR_WOM_DUMMY                         -0.05       -0.10    -0.12       0.07
## MINISTER_WOM_DUMMY                       0.25       -0.20     0.14       0.03
## MINISTER_GRÜNE_DUMMY                    -0.03       -0.31    -0.03       0.57
## MINISTER_CDUCSU_DUMMY                    0.05        0.71     0.13      -0.24
## MINISTER_SPD_DUMMY                       0.05       -0.43    -0.13      -0.19
## MINISTER_LINKE_DUMMY                    -0.08       -0.23     0.01      -0.10
## MINISTER_OTHER_DUMMY                    -0.10       -0.05    -0.02      -0.08
## GRÜNE_in_REG                            -0.04       -0.32     0.03       0.59
## CDUCSU_in_REG                            0.04        0.50    -0.03      -0.26
## SPD_in_REG                               0.02       -0.68    -0.06       0.15
## FDP_in_REG                               0.30        0.09     0.44       0.03
```

```
## LINKE_in_REG                        -0.10       -0.27    -0.08      -0.04
## COMM_CHAIR_GRÜNE_DUMMY              -0.14        0.04     0.02       0.03
## COMM_CHAIR_CDUCSU_DUMMY             -0.33        0.05     0.13       0.03
## COMM_CHAIR_SPD_DUMMY                -0.22       -0.12    -0.03      -0.11
## COMM_CHAIR_LINKE_DUMMY              -0.13       -0.12    -0.08       0.03
## COMM_CHAIR_OTHER_DUMMY               1.00        0.05    -0.02       0.09
## PROP_CDUCSU                          0.05        1.00    -0.19      -0.26
## PROP_FDP                            -0.02       -0.19     1.00       0.27
## PROP_GRÜNE                           0.09       -0.26     0.27       1.00
## PROP_SPD                            -0.20       -0.36    -0.21      -0.05
## PROP_LINKE                          -0.08       -0.46    -0.10      -0.30
## PROP_OTHER                           0.26       -0.28    -0.09       0.00
## AVG_AGE_START                        0.05       -0.16     0.16       0.17
## AVG_OCCEXP_BROAD_UMWELT              0.14       -0.07     0.29       0.03
## AVG_EDU                             -0.09       -0.15    -0.04      -0.11
## EAST_DUMMY                          -0.06       -0.37    -0.09      -0.32
##                          PROP_SPD PROP_LINKE PROP_OTHER AVG_AGE_START
## PROP_WOM                     0.06       0.38       0.03          0.26
## PROP_WOM_IN_PARL             0.18       0.37       0.08          0.27
## LR_DUMMY                    -0.01       0.01      -0.06          0.05
## AMENDMENT_DUMMY              0.02      -0.05      -0.03          0.10
## CHAIR_WOM_DUMMY              0.28       0.03      -0.25          0.07
## MINISTER_WOM_DUMMY           0.00       0.10       0.10         -0.01
## MINISTER_GRÜNE_DUMMY         0.07      -0.14       0.21          0.38
## MINISTER_CDUCSU_DUMMY       -0.55      -0.16      -0.13         -0.03
## MINISTER_SPD_DUMMY           0.55       0.17      -0.04         -0.19
## MINISTER_LINKE_DUMMY        -0.02       0.43      -0.12         -0.08
## MINISTER_OTHER_DUMMY         0.19      -0.15       0.10         -0.14
## GRÜNE_in_REG                 0.07      -0.15       0.19          0.31
## CDUCSU_in_REG               -0.51      -0.02       0.09          0.12
## SPD_in_REG                   0.42       0.29       0.13         -0.06
## FDP_in_REG                  -0.20      -0.19       0.08          0.15
## LINKE_in_REG                -0.09       0.41       0.10         -0.10
## COMM_CHAIR_GRÜNE_DUMMY      -0.10       0.08      -0.07          0.21
## COMM_CHAIR_CDUCSU_DUMMY      0.05      -0.08      -0.16          0.10
## COMM_CHAIR_SPD_DUMMY         0.25       0.03      -0.08         -0.06
## COMM_CHAIR_LINKE_DUMMY      -0.10       0.08       0.26         -0.17
## COMM_CHAIR_OTHER_DUMMY      -0.20      -0.08       0.26          0.05
## PROP_CDUCSU                 -0.36      -0.46      -0.28         -0.16
## PROP_FDP                    -0.21      -0.10      -0.09          0.16
## PROP_GRÜNE                  -0.05      -0.30       0.00          0.17
## PROP_SPD                     1.00      -0.21      -0.32          0.06
## PROP_LINKE                  -0.21       1.00      -0.02         -0.14
## PROP_OTHER                  -0.32      -0.02       1.00          0.17
## AVG_AGE_START                0.06      -0.14       0.17          1.00
## AVG_OCCEXP_BROAD_UMWELT     -0.17       0.10       0.01          0.01
## AVG_EDU                     -0.27       0.42       0.17         -0.09
## EAST_DUMMY                  -0.28       0.70       0.35         -0.23
##                          AVG_OCCEXP_BROAD_UMWELT AVG_EDU EAST_DUMMY
## PROP_WOM                                   -0.16   -0.01       0.10
## PROP_WOM_IN_PARL                           -0.04   -0.02       0.16
## LR_DUMMY                                   -0.04   -0.01      -0.01
## AMENDMENT_DUMMY                            -0.04   -0.09      -0.17
## CHAIR_WOM_DUMMY                             0.16   -0.05      -0.07
```

```
## MINISTER_WOM_DUMMY                      0.12   -0.01       0.04
## MINISTER_GRÜNE_DUMMY                   -0.05   -0.07      -0.15
## MINISTER_CDUCSU_DUMMY                   0.08   -0.09      -0.11
## MINISTER_SPD_DUMMY                      0.01    0.04       0.19
## MINISTER_LINKE_DUMMY                   -0.05    0.25       0.19
## MINISTER_OTHER_DUMMY                   -0.07   -0.15      -0.08
## GRÜNE_in_REG                            0.03   -0.03      -0.10
## CDUCSU_in_REG                           0.00    0.11       0.04
## SPD_in_REG                              0.06    0.09       0.31
## FDP_in_REG                              0.30   -0.07      -0.14
## LINKE_in_REG                           -0.11    0.22       0.26
## COMM_CHAIR_GRÜNE_DUMMY                 -0.07    0.06      -0.15
## COMM_CHAIR_CDUCSU_DUMMY                -0.08   -0.21      -0.19
## COMM_CHAIR_SPD_DUMMY                   -0.04   -0.01       0.04
## COMM_CHAIR_LINKE_DUMMY                  0.18    0.40       0.53
## COMM_CHAIR_OTHER_DUMMY                  0.14   -0.09      -0.06
## PROP_CDUCSU                            -0.07   -0.15      -0.37
## PROP_FDP                                0.29   -0.04      -0.09
## PROP_GRÜNE                              0.03   -0.11      -0.32
## PROP_SPD                               -0.17   -0.27      -0.28
## PROP_LINKE                              0.10    0.42       0.70
## PROP_OTHER                              0.01    0.17       0.35
## AVG_AGE_START                           0.01   -0.09      -0.23
## AVG_OCCEXP_BROAD_UMWELT                 1.00    0.39       0.34
## AVG_EDU                                 0.39    1.00       0.56
## EAST_DUMMY                              0.34    0.56       1.00
```

Here's a Variance Inflation Facotr (VIF) test for the specification with SPD and LINKE variables included The highest VIF is 2.69, so there doesn't seem to be a multicollinearity concern with this specification

```
preds <- c(
  "PROP_WOM","LR_DUMMY","AMENDMENT_DUMMY","MINISTER_WOM_DUMMY","MINISTER_GRÜNE_DUMMY","MINISTER_SPD_DUM
  "CHAIR_WOM_DUMMY","COMM_CHAIR_GRÜNE_DUMMY","COMM_CHAIR_SPD_DUMMY","COMM_CHAIR_LINKE_DUMMY","AVG_AGE_S
  "EAST_DUMMY","AVG_EDU","ALIGN_CHAIR_MINISTER","PROP_WOM_IN_PARL"
)

# pick an available numeric outcome (VIF depends on X, not y)
y <- if ("cosine_similarity" %in% names(merged_df)) "cosine_similarity" else "delta_total_dict_matches"

# build clean data and model
use <- merged_df %>% select(all_of(c(y, preds))) %>% na.omit()
form <- as.formula(paste(y, "~", paste(preds, collapse = " + ")))
m <- lm(form, data = use)

# compute VIFs (supports GVIF output if any multi-df terms exist)
v <- car::vif(m)
vif_tbl <-
  if (is.matrix(v) && "GVIF" %in% colnames(v)) {
    data.frame(term = rownames(v),
               GVIF = v[,"GVIF"],
               Df = v[,"Df"],
               GVIF_adj = v[,"GVIF"]^(1/(2*v[,"Df"])),
               row.names = NULL)
  } else {
```

```r
    data.frame(term = names(v), VIF = as.numeric(v), row.names = NULL)
  }

# sort and flag
vif_tbl <- vif_tbl %>%
  mutate(flag5  = ifelse((VIF %||% GVIF_adj) > 5,  ">", ""),
         flag10 = ifelse((VIF %||% GVIF_adj) > 10, ">>", "")) %>%
  arrange(desc(VIF %||% GVIF_adj))

print(vif_tbl, row.names = FALSE)
```

```
##                      term      VIF flag5 flag10
##          PROP_WOM_IN_PARL 2.693857
##                  PROP_WOM 2.365998
##                EAST_DUMMY 2.294848
##                   AVG_EDU 1.841368
##    COMM_CHAIR_LINKE_DUMMY 1.689886
##             AVG_AGE_START 1.596575
##      MINISTER_LINKE_DUMMY 1.594808
##      MINISTER_GRÜNE_DUMMY 1.587640
##   AVG_OCCEXP_BROAD_UMWELT 1.581411
##    COMM_CHAIR_GRÜNE_DUMMY 1.513501
##           CHAIR_WOM_DUMMY 1.392979
##      ALIGN_CHAIR_MINISTER 1.391708
##        MINISTER_SPD_DUMMY 1.323537
##        MINISTER_WOM_DUMMY 1.318228
##      COMM_CHAIR_SPD_DUMMY 1.297860
##           AMENDMENT_DUMMY 1.091104
##                  LR_DUMMY 1.062992
```

```r
cat("\nNotes:\n- Thresholds: >5 (moderate), >10 (high).\n- VIF shown is VIF (or GVIF^(1/(2*Df)) when ap
```

```
##
## Notes:
## - Thresholds: >5 (moderate), >10 (high).
## - VIF shown is VIF (or GVIF^(1/(2*Df)) when applicable).
```

— Variable Ranges for the Variable Definitions in Appendix —

Minimum and Maximum values of PROP_WOM and PROP_WOM_IN_PARL in the dataset PROP_WOM: 0-0.778 PROP_WOM_IN_PARL: 0.0677-0.410

```r
# Min/max for PROP_WOM and PROP_WOM_IN_PARL (overall)
vars <- c("PROP_WOM","PROP_WOM_IN_PARL")
missing <- setdiff(vars, names(merged_df))
if (length(missing)) stop("Missing variables: ", paste(missing, collapse = ", "))

overall_extrema <- sapply(merged_df[vars], function(x) {
  c(min = min(x, na.rm = TRUE), max = max(x, na.rm = TRUE))
})
```

```r
overall_extrema <- as.data.frame(t(overall_extrema))
print(overall_extrema)
```

```
##                      min   max
## PROP_WOM          0.0000 0.778
## PROP_WOM_IN_PARL 0.0677 0.410
```