How Beliefs of the Political Elite and Citizens on Climate Change Influence Support for Swiss Energy Transition Policy

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Abstract

This paper analyzes factors that lead to opposition towards policies in Switzerland that promote a clean energy transition. During legislative processes, both the elite and general citizens can develop resistance towards such policies. The article considers those two perspectives and determines, on both levels, factors that explain opposition. We also specifically take into account whether climate change skepticism, i.e., questioning that climate change is real and human-induced, is a key factor that leads to opposition. Furthermore, we employ structural equation models to account for interactions between the elite and general citizens. The results show that political actors who reject the idea of man-made climate change also oppose the promotion of a clean energy transition, and more generally that elite actors influence how citizens think about the issue. At the citizen level, an increase in climate change skepticism has a negative impact on levels of support for clean energy policy. The link is mainly determined by party affiliation. We conclude that potential strategies for achieving a clean energy transition should focus on motivating citizens because they generally seem to be less polarized and partisan, and thus less opposed to new solutions, than the elite, who tend to be more constrained in their actions.

1   Setup

```
knitr::opts_chunk$set(include=TRUE, echo=TRUE,
                      warning=FALSE, error=TRUE, message=FALSE,
                      fig.align="center", dpi=300,
                      dev='png')


rm(list = ls())
setwd("~/Git/paper_inevitable/docu")


# Load packages
if (!require("pacman", quietly=T)) install.packages("pacman")
pacman::p_load('tidyverse',
```
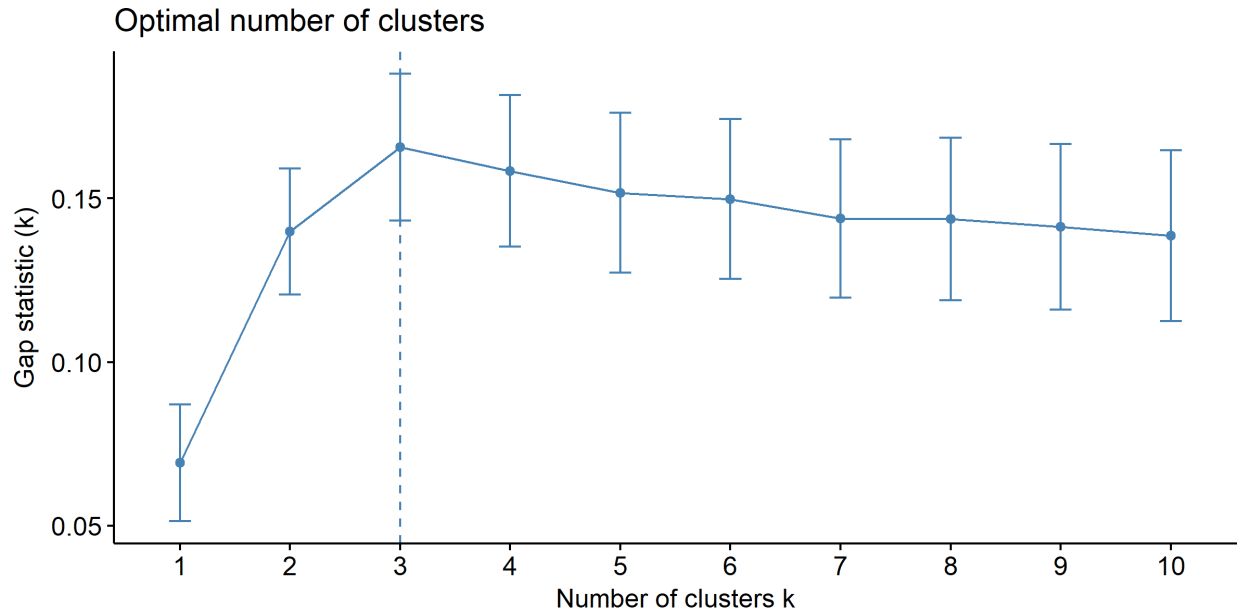
Optimal number of clusters

Figure 1: Clusters.

```
            'factoextra','pvclust','cluster',
            'NbClust','tableHTML','ggdendro',
            'psych','Hmisc','lavaan','DiagrammeR',
            'corrplot','extrafont')
loadfonts(device="win", quiet=T)
```

2   Elite level

2.1   Clusters

On elite level, we first calculate clusters that reflect how the elite (parties, organizations, lobby groups) share or deviate in their preferences and beliefs.

```
# Load Clusterdata, Kammermann & Strotz 2016
federal <- read.csv("data/Cluster.csv", sep=";", header=T, row.names=1)
federal <- beliefs <- na.omit(federal)
federal <- scale(federal)

# Determining Clusters
# Gap statistic
gap_stat <- clusGap(federal, FUN=hcut, K.max=10, B=30)
fviz_gap_stat(gap_stat)
```

The gap-statstic shows that choosing three clusters would be statistically 'optimal'. However, we are confident that four clusters represent the actual distribution of actors more accurately on a contextual level. The third cluster's confidence interval indicated in the graph also covers the fourth cluster. We are thus also 'safe' on a statistical level.

```r
# P-values for hierarchical clustering
pvclust(federal, method.hclust = "complete",
        method.dist = "euclidean", nboot = 1000)
```

```
## Bootstrap (r = 0.48)... Done.
## Bootstrap (r = 0.58)... Done.
## Bootstrap (r = 0.7)... Done.
## Bootstrap (r = 0.79)... Done.
## Bootstrap (r = 0.88)... Done.
## Bootstrap (r = 1.0)... Done.
## Bootstrap (r = 1.09)... Done.
## Bootstrap (r = 1.18)... Done.
## Bootstrap (r = 1.27)... Done.
## Bootstrap (r = 1.39)... Done.

##
## Cluster method: complete
## Distance      : euclidean
##
## Estimates on edges:
##
##        au    bp se.au se.bp      v     c  pchi
## 1   0.943 0.786 0.009 0.004 -1.187 0.394 0.439
## 2   0.913 0.426 0.012 0.005 -0.588 0.774 0.380
## 3   0.827 0.556 0.019 0.005 -0.542 0.401 0.608
## 4   0.715 0.397 0.026 0.005 -0.153 0.415 0.673
## 5   0.880 0.171 0.019 0.004 -0.113 1.064 0.567
## 6   0.927 0.198 0.013 0.004 -0.302 1.151 0.783
## 7   0.683 0.253 0.030 0.005  0.095 0.570 0.287
## 8   0.907 0.434 0.013 0.005 -0.578 0.745 0.852
## 9   0.892 0.491 0.014 0.005 -0.606 0.629 0.038
## 10 0.912 0.059 0.023 0.002  0.103 1.458 0.320
## 11 0.784 0.421 0.023 0.005 -0.293 0.493 0.193
## 12 0.820 0.439 0.020 0.005 -0.380 0.534 0.415
## 13 0.884 0.111 0.022 0.003  0.014 1.207 0.714
## 14 0.841 0.408 0.019 0.005 -0.384 0.617 0.127
## 15 0.691 0.246 0.030 0.005  0.093 0.593 0.714
## 16 0.902 0.281 0.015 0.005 -0.356 0.937 0.536
## 17 0.960 0.378 0.007 0.005 -0.720 1.030 0.981
```

```
## 18 0.818 0.049 0.038 0.002  0.376 1.283 0.589
## 19 0.857 0.038 0.037 0.002  0.355 1.422 0.950
## 20 0.690 0.358 0.027 0.005 -0.067 0.431 0.579
## 21 0.587 0.022 0.069 0.002  0.896 1.116 0.742
## 22 0.751 0.047 0.046 0.002  0.499 1.177 0.298
## 23 0.692 0.131 0.035 0.004  0.309 0.812 0.150
## 24 0.871 0.025 0.041 0.002  0.418 1.547 0.110
## 25 0.881 0.201 0.018 0.004 -0.171 1.010 0.072
## 26 0.631 0.052 0.049 0.002  0.646 0.981 0.217
## 27 0.618 0.022 0.068 0.002  0.856 1.156 0.034
## 28 0.888 0.091 0.023 0.003  0.060 1.277 0.516
## 29 1.000 1.000 0.000 0.000  0.000 0.000 0.000
```

```r
# Assessing validity of clusters by sampling beliefs
set.seed(123)
ss <- sample(1:30, 15) # extract 15 samples out of federal
federalss <- federal[, ss]

federalt <- t(federalss)
res.pv <- pvclust(federalt, method.dist = "euclidean",
                  method.hclust = "complete", nboot = 10)
```

```
## Bootstrap (r = 0.47)... Done.
## Bootstrap (r = 0.6)... Done.
## Bootstrap (r = 0.67)... Done.
## Bootstrap (r = 0.8)... Done.
## Bootstrap (r = 0.87)... Done.
## Bootstrap (r = 1.0)... Done.
## Bootstrap (r = 1.07)... Done.
## Bootstrap (r = 1.2)... Done.
## Bootstrap (r = 1.27)... Done.
## Bootstrap (r = 1.4)... Done.
```

```r
plot(res.pv, hang = 1, cex = 1)
pvrect(res.pv)
```

```r
# Calculating clusters
d_federal <- dist(federal, method = "euclidean")
model_fed <- hclust(d_federal, method="complete")

# Assessing robustness of clusters by using another clustering method
d_federal2 <- dist(federal, method = "manhattan") # distance matrix
model_fed2 <- hclust(d_federal2, method="complete")
```

Cluster dendrogram with AU/BP values (%)
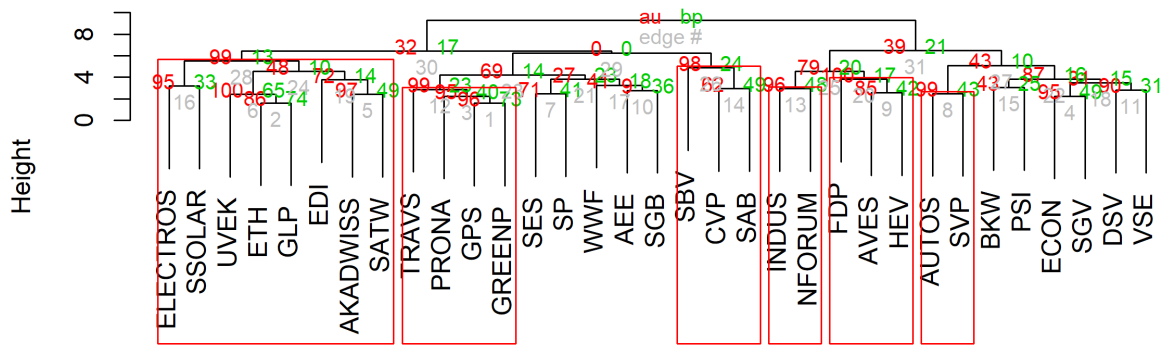
Distance: euclidean
Cluster method: complete

Figure 2: Clusters.

The clusters obtained with the second clustering method stay largely the same as with the euclidean clustering method.

However, a group of three actors (PSI, BKW, & VSE) switch from the semi-anti cluster to the pro cluster. The specific beliefs of theses three actors show that they belong to the 'least opposed' to the new strategy, from the semi-anti cluster. This is due to the fact that (e.g.) the PSI, as a research center for nuclear energy, will be heavilyaffected by the ban on constructing new reactors. Otherwise, the PSI supports a large part of the beliefs of the pro cluster.

```
# final dendrogram plot in ggplot
d <- as.dendrogram(model_fed)
d <- dendro_data(d, type = "rectangle")
groups <- cutree(model_fed, k=4) # k = number of clusters
groups <- data.frame(label=names(groups), groups=factor(groups))
d$labels <- full_join(d$labels, groups, by=c("label"))
d$labels$groups <- recode_factor(d$labels$groups,
                            '4'="very_pro",
                            '1'="pro",
                            '2'="semi_anti",
                            '3'="anti")
d$labels$shift <- 0
d$labels$shift[d$labels$groups=="pro"] <- 0.6
d$labels$shift[d$labels$groups=="very_pro"] <- 0.2
d$labels$shift[d$labels$groups=="semi_anti"] <- -0.2
d$labels$shift[d$labels$groups=="anti"] <- -0.6
```

```r
segments <- segment(d)
segments$shift <- 0
segments$shift[segments$x>20] <- 0.6
segments$shift[segments$x>13.7 & segments$x<21] <- 0.2
segments$shift[segments$x>4.9 & segments$x<13.7] <- -0.2
segments$shift[segments$x<4.9] <- -0.6
segments$shift[segments$y>8.5] <- 0

ggplot(segments) +
    geom_segment(aes(x = x+shift, y = y, xend = xend+shift, yend = yend),
                 show.legend=F) +
    geom_point(data = d$labels,
               aes(x = x+shift, y = y-0.04,
                   shape = groups, color = groups)) +
    geom_text(data = d$labels,
              aes(x = x+shift, y = y-0.3, label = label, color = groups),
              vjust = 0.5, hjust = 0, size = 2.5, show.legend = F) +
    coord_flip() +
    scale_y_reverse(expand=c(0.3, 0)) +
    scale_shape_manual(values=c(16,18,1,15)) +
    scale_color_brewer(palette="RdBu", direction=-1) +
    labs(title = "Cluster Dendrogram",
         shape="Clusters", color="Clusters") +
    theme_dendro() +
    theme(text=element_text(family='Archivo Narrow'))
```

```r
ggsave(file = 'img/Clusters.png',
       width = 11, height = 12, units = 'cm')

rm(federal, table, d_federal, gap_stat, groups, d, i, j,
   list.distance, list.methods, model_fed, nb, segments,
   res.pv, federalt, federalss, ss, table, list.methods, list.distance)
```

2.2 Beliefs

```r
# Calculating clusters' beliefs
beliefs$actors <- rownames(beliefs)

# generate column with cluster names
```
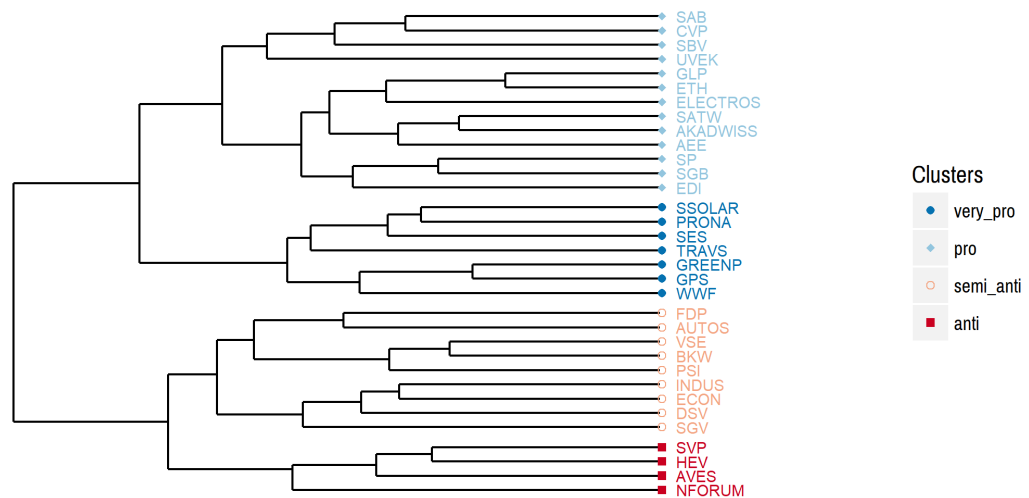
Cluster Dendrogram

Figure 3: Clusters.

```r
beliefs[,"cluster"] <- NA
beliefs[c("NFORUM", "AVES", "SVP", "HEV"),"cluster"] = "anti"
beliefs[c("SGV", "DSV", "ECON", "INDUS", "PSI", "BKW", "VSE",
          "AUTOS", "FDP"),"cluster"] = "semi_anti"
beliefs[c("WWF", "GPS", "GREENP", "TRAVS", "SES", "PRONA",
          "SSOLAR"),"cluster"] = "very_pro"
beliefs[c("EDI", "SGB", "SP", "AEE", "AKADWISS", "SATW", "ELECTROS",
          "ETH", "GLP", "UVEK", "SBV", "CVP", "SAB"),"cluster"] = "pro"


beliefs$cluster <- factor(beliefs$cluster,
                          levels=c("very_pro","pro","semi_anti","anti"))


beliefs %>%
  select(actors, cluster, meconomix, renewpref, climtargets, equalaccess,
         economix, guarantsuppl, sectautono) %>%
  gather("policy", "value", -actors, -cluster) %>%
  na.omit() %>%
  group_by(policy, cluster) %>%
  summarise(mean = mean(value),
            se = sd(value) / sqrt(n())) %>%
  ggplot(aes(x = policy, y = mean, color = cluster,
             ymin = mean - se, ymax = mean + se)) +
```
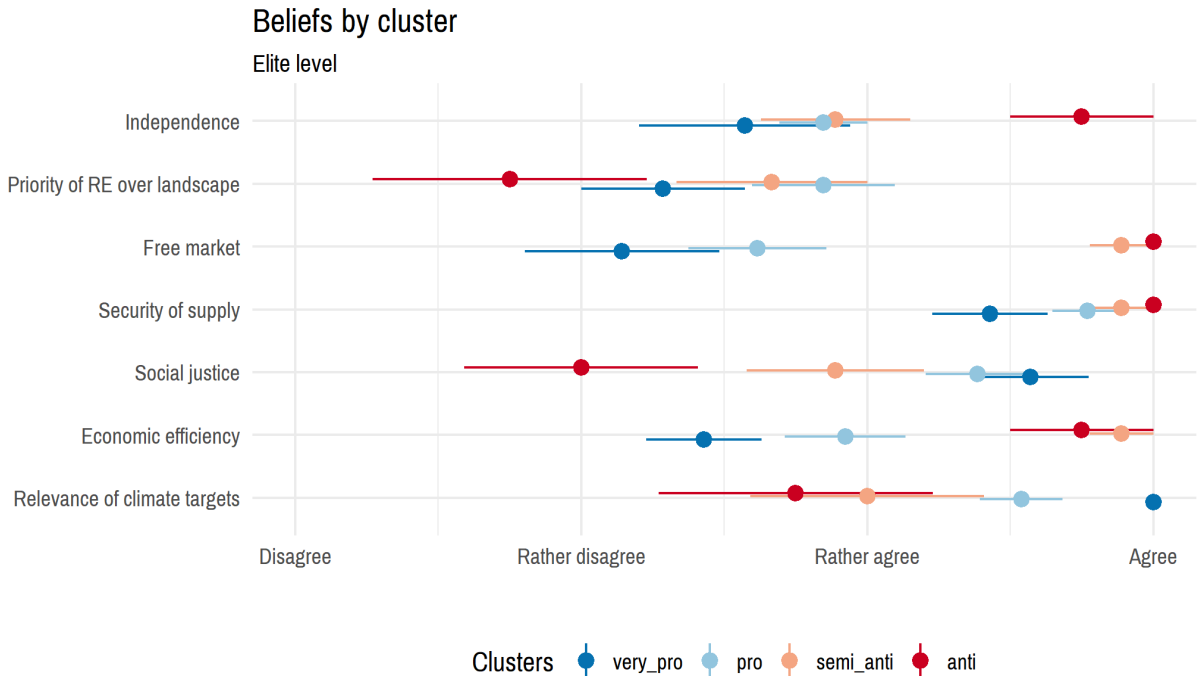
Figure 4: Beliefs, elite level.

```r
geom_pointrange(size = .5,
                position=position_dodge(width=0.2)) +
coord_flip() +
scale_x_discrete(labels=c("Relevance of climate targets",
                          "Economic efficiency",
                          "Social justice", "Security of supply",
                          "Free market",
                          "Priority of RE over landscape",
                          "Independence")) +
scale_y_continuous(lim=c(1,4),
                   labels=c("Disagree","Rather disagree",
                            "Rather agree","Agree")) +
scale_color_brewer(palette="RdBu", direction=-1) +
labs(title = "Beliefs by cluster",
     subtitle="Elite level",
     x = "", y = "",
     color="Clusters") +
theme_minimal() +
theme(text=element_text(family='Archivo Narrow'),
      legend.position="bottom")
```

```
ggsave(file = 'img/Beliefs_Dotplot_byactor.png',
       width = 15, height = 10, units = 'cm')
rm(beliefs)
```

2.3 Policy preferences

```
# Load Clusterdata, Kammermann & Strotz 2016
policies <- read.csv("data/Cluster2.csv", sep=";", header=T, row.names=1)
policies <- na.omit(policies)
policies$actors <- rownames(policies)

# generate column with cluster names
policies[,"cluster"] <- NA
policies[c("NFORUM", "AVES", "SVP", "HEV"),"cluster"] = "anti"
policies[c("SGV", "DSV", "ECON", "INDUS", "PSI", "BKW", "VSE",
           "AUTOS", "FDP"),"cluster"] = "semi_anti"
policies[c("WWF", "GPS", "GREENP", "TRAVS", "SES", "PRONA",
           "SSOLAR"),"cluster"] = "very_pro"
policies[c("EDI", "SGB", "SP", "AEE", "AKADWISS", "SATW", "ELECTROS",
           "ETH", "GLP", "UVEK", "SBV", "CVP", "SAB"),"cluster"] = "pro"

policies$cluster <- factor(policies$cluster,
                           levels=c("very_pro","pro","semi_anti","anti"))

policies %>%
  select(actors, cluster, phaseout, cap,
         chargerelief, research) %>%
  gather("policy", "value", -actors, -cluster) %>%
  na.omit() %>%
  group_by(policy, cluster) %>%
  summarise(mean = mean(value),
            se = sd(value) / sqrt(n())) %>%
  ggplot(aes(x = policy, y = mean, color = cluster,
             ymin = mean - se, ymax = mean + se)) +
    geom_pointrange(size = .5,
                    position=position_dodge(width=0.2)) +
    coord_flip() +
    scale_x_discrete(labels=c("Raise RE Tax", "Compensation CO2-tax",
                              "Nuclear Phaseout",
                              "Research")) +
```
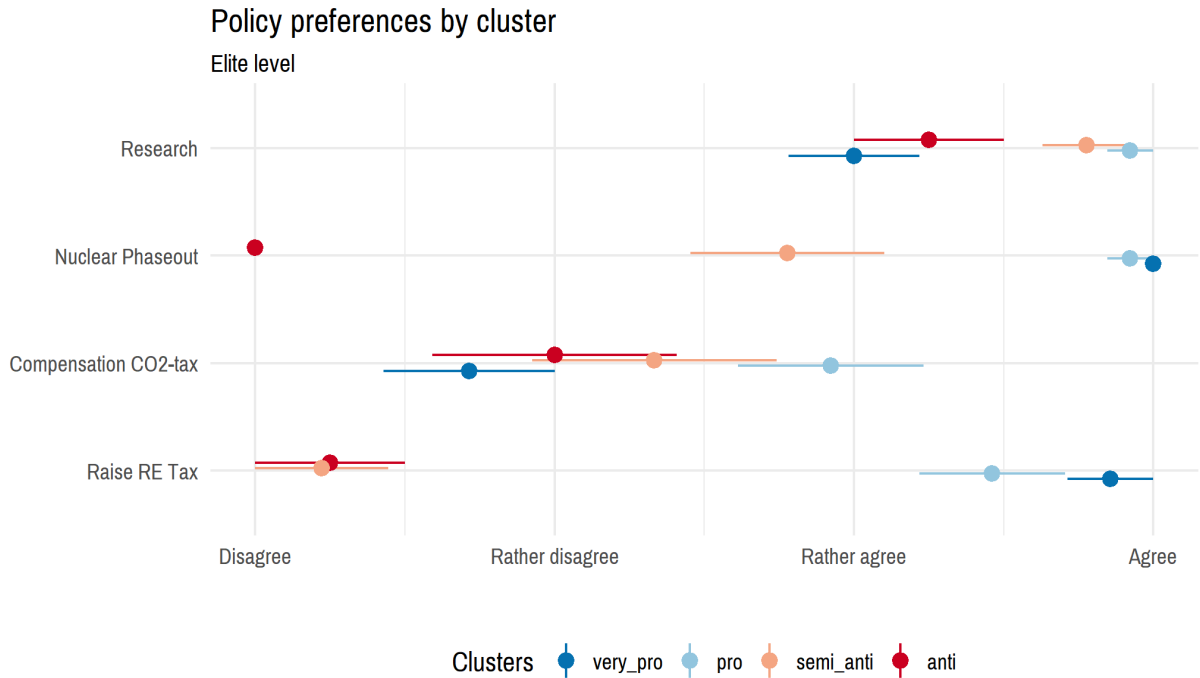
Figure 5: Policy preferences, elite level.

```
    scale_y_continuous(lim=c(1,4),
                    labels=c("Disagree","Rather disagree",
                             "Rather agree","Agree")) +
    scale_color_brewer(palette="RdBu", direction=-1) +
    labs(title = "Policy preferences by cluster",
        subtitle="Elite level",
        x = "", y = "",
        color="Clusters") +
    theme_minimal() +
    theme(text=element_text(family='Archivo Narrow'),
        legend.position="bottom")
```

```
ggsave(file = 'img/Policies_Dotplot_byactor.png',
      width = 15, height = 10, units = 'cm')
rm(policies)
```

3 Individual level

3.1 Preferences for Energy Strategy 2050

First, a comparison to the instrument preferences on elite level is done. For this, four variables are evaluated in the same way as for the clusters in the elite analysis. Clustering respondents into similar groups as with the elite was also tested. However, the results remained inconclusive, as the differences in attitudes for individuals compared to parties are smaller and less polarized, therefore not yielding interpretable clusters.

```r
# Load data Stadelmann-Steffen & Dermont 2016, recoded
load("data/inevitable.rData")
inev$party <- recode_factor(inev$party, "Greens" = "GPS")

inev$cluster <- recode_factor(
  inev$party,
  "GPS"="very_pro",
  "CVP"="pro",
  "GLP"="pro",
  "SP"="pro",
  "other/none"="other",
  "FDP"="semi_anti",
  "SVP"="anti"
)

inev %>%
  select(cluster, nucl.pow4, kev4, kevplus4, co24) %>%
  gather("policy", "value",-cluster) %>%
  na.omit() %>%
  group_by(policy, cluster) %>%
  summarise(mean = mean(value),
            se = sd(value) / sqrt(n())) %>%
  ggplot(aes(x = policy, y = mean, color = cluster,
             ymin = mean - se, ymax = mean + se)) +
    geom_pointrange(size = .5,
                    position=position_dodge(width=0.2)) +
    coord_flip() +
    scale_x_discrete(labels=c("co24"="CO2-tax",
                              "kev4"="RE tax",
                              "kevplus4"="Raise RE tax",
                              "nucl.pow4"="Nuclear Phaseout")) +
    scale_y_continuous(lim=c(1,4),
                       labels=c("Disagree","Rather disagree",
```
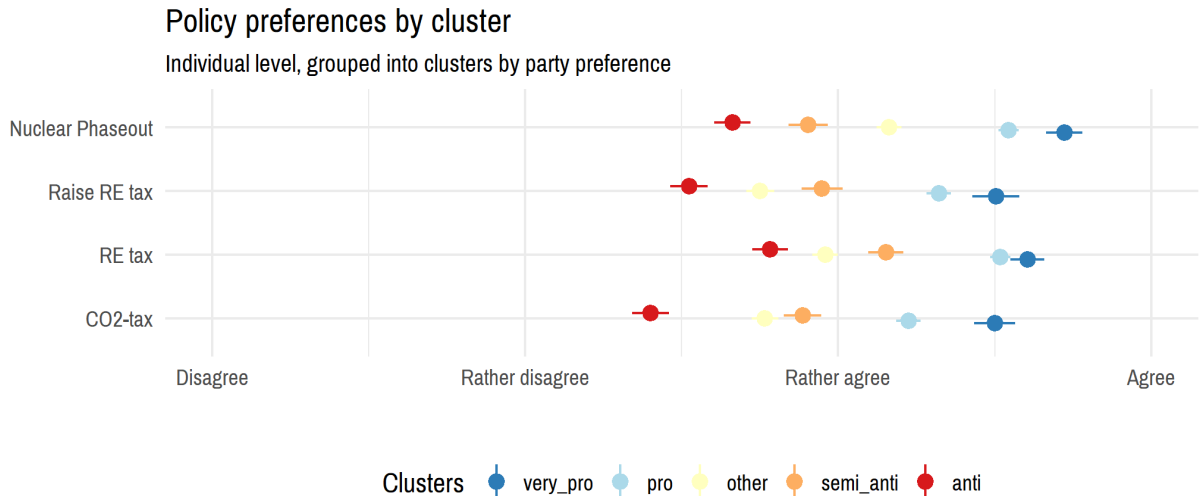
Figure 6: Policy preferences, individual level.

```
                         "Rather agree","Agree")) +
    scale_color_brewer(palette="RdYlBu", direction=-1) +
    labs(title = "Policy preferences by cluster",
         subtitle=paste0("Individual level, grouped into ",
                    "clusters by party preference"),
         x = "", y = "",
         color="Clusters") +
    theme_minimal() +
    theme(text=element_text(family='Archivo Narrow'),
          legend.position="bottom")
```

```
ggsave(file = 'img/Policies_Dotplot_individual.png',
       width = 15, height = 10, units = 'cm')
```

Also, the question arises which energy sources are preferred by the respondents, depending on the party position.

```
inev %>%
  select(cluster, starts_with("em.")) %>%
  gather("source", "value",-cluster) %>%
  na.omit() %>%
  group_by(source, cluster) %>%
  summarise(mean = mean(value),
            se = sd(value) / sqrt(n())) %>%
  mutate(min = min(mean)) %>%
  ggplot(aes(x = reorder(source, min), y = mean, color = cluster,
```

```
            ymin = mean - se, ymax = mean + se)) +
    geom_pointrange(size = .5,
                    position=position_dodge(width=0.2)) +
    coord_flip() +
    scale_x_discrete(
      labels=c("em.solar.power"="Solar Power",
               "em.large.hydroelectricity"="Large Hydroelectricity",
               "em.biomass.power"="Biomass Power",
               "em.wind.power"="Wind Power",
               "em.geothermal.power"="Geothermal Power",
               "em.small.hydroelectricity"="Small Hydroelectricity",
               "em.gas.power"="Gas Power",
               "em.electricity.imports"="Electricity Imports",
               "em.nuclear.power"="Nuclear Power")) +
    scale_y_continuous(lim=c(1,4),
                       labels=c("Disagree","Rather disagree",
                                "Rather agree","Agree")) +
    scale_color_brewer(palette="RdYlBu", direction=-1) +
    labs(title = "Energy mix preferences by cluster",
         subtitle=paste0("Individual level, grouped into ",
                         "clusters by party preference"),
         x = "", y = "",
         color="Clusters") +
    theme_minimal() +
    theme(text=element_text(family='Archivo Narrow'),
          legend.position="bottom")

ggsave(file = 'img/eMix_Dotplot_individual.png',
       width = 15, height = 10, units = 'cm')
```

3.2   Look into further promotional measures

As those measures are generally defined for the next few years through the 2017 vote on the energy act, a look at how possible policies are supported or opposed by individuals will be the next step.

As dependent variables, we consider seven different policies to promote and the option not to promote energy transitions. The questions were framed for four specific types of renewable energy, namely wind power, solar power, small hydroelectricity and geothermal energy. Each respondent was treated with one energy source, leading to four sub-samples with answers to a specific type of renewable energy, which are combined in the analysis to get to overarching answers on energy transitions. The policies are:

- Tax reductions for operators of renewable energy plants

Energy mix preferences by cluster

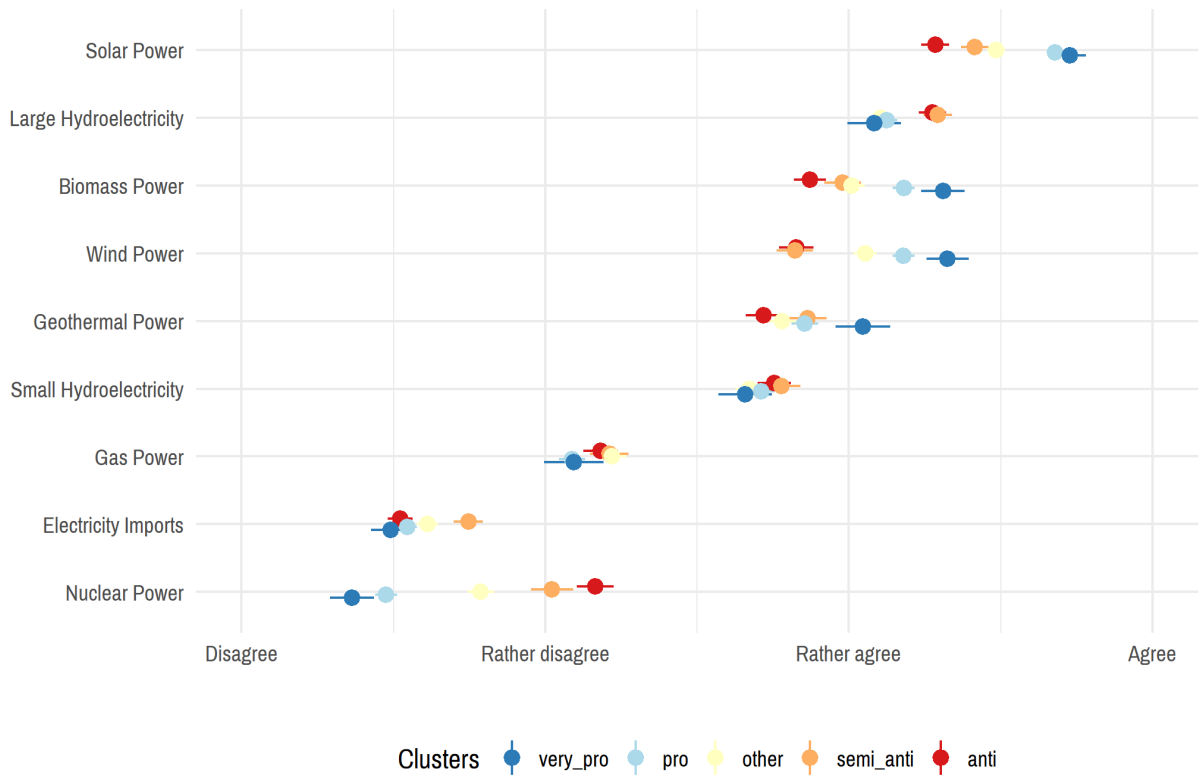Individual level, grouped into clusters by party preference

Figure 7: Energy mix preferences, individual level.

- Subsidies for building renewable energy plants
- Bans on building electricity plants for non-renewable energy sources
- Public tendering to find investors for building renewable energy plants
- Public investments in the production of renewable energy
- Energy companies shall be instructed to build renewable energy plants
- More information, consultation and education for people considering building renewable energy plants
- None of the above, renewable energies should not be promoted

The respondents had the possibility to select all of the options they wanted, excluding combinations of "none" with the others. Furthermore, an option to select "don't know" was provided. The order of the policies was randomized for each individual, excluding the presentation of "none" and "don't know" at the end.

```r
# Dependent variables: policies
inev %>%
  gather("policy", "agree", starts_with("pr.")) %>%
  group_by(policy) %>%
  summarise(count=sum(agree)) %>%
  ggplot(aes(x=reorder(policy, -count), y=count)) +
  geom_bar(stat="identity") +
  labs(title="Policies",
       subtitle=paste0("answers with agree or rather agree out of ",
                       nrow(inev)," observations"),
       x="Policy instrument", y="Count") +
  theme_minimal() +
  theme(text=element_text(family='Archivo Narrow'),
        axis.text.x=element_text(angle=45,hjust=1))
```

For all models, the main explaining variables are climate change skepticism, general attitudes towards the environment and the political ideology by party preference. We will break up the clusters combining the Social Democrats, the Green Liberals and the Christian Democrats to gain further insights into how their positions might vary.

Climate change is composed from four variables with four answers: agree/rather agree/rather disagree/disagree, whereby agreement with the statements is coded as being skeptic on human-induced climate change:

- `climScept.1`: I'm unsure if climate change really happens
- `climScept.2`: Climate change is primarily caused by humans (recoded)
- `climScept.3`: The consequences of climate change are exaggerated
- `climScept.4`: Climate change is an excuse to patronize or tax people

```r
# Climate change skepticism, higher = more skeptic
inev %>%
  gather("climSceptx", "val", starts_with("climScept")) %>%
  ggplot(aes(x=val)) +
  geom_histogram(binwidth=1) +
```
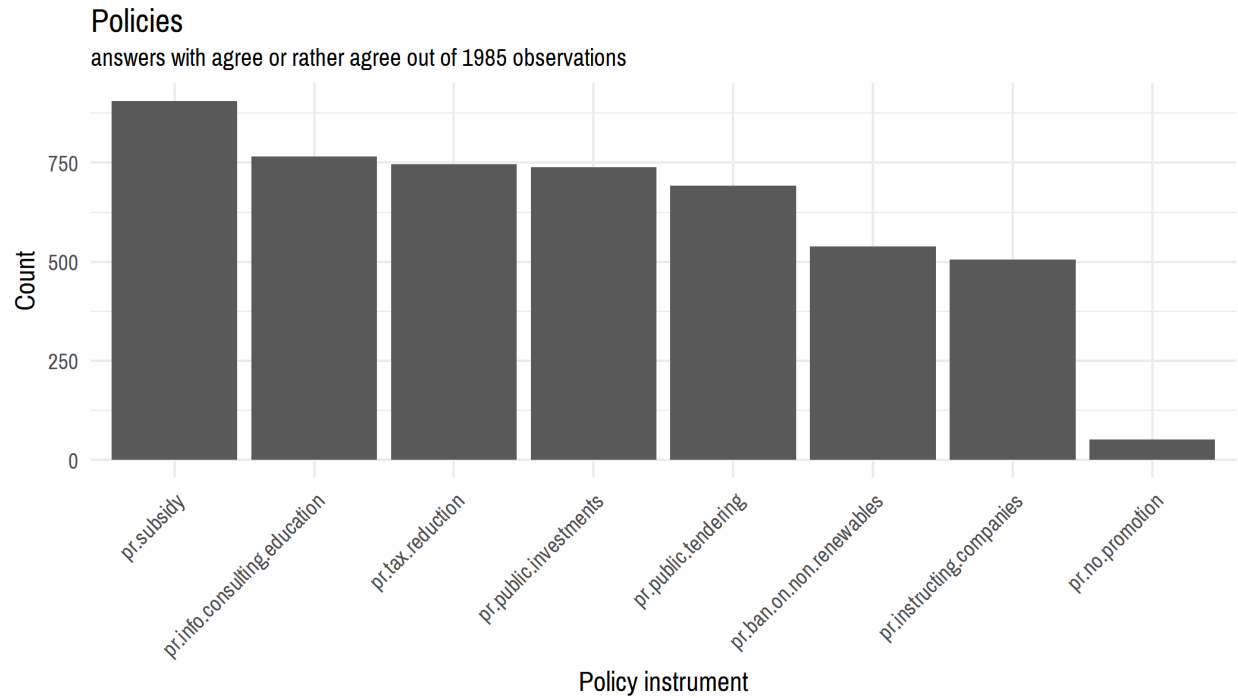
Policies
answers with agree or rather agree out of 1985 observations

Figure 8: Dependent variables.

```r
facet_wrap(~climSceptx, scales="free_x") +
labs(title="Climate change skepticism",
     subtitle="high values = more skeptic") +
theme_minimal() +
theme(text=element_text(family='Archivo Narrow'))
```

```r
# Cronbachs' alpha
climScept <- select(inev, starts_with("climScept."))
psych::alpha(climScept)
```

```
##
## Reliability analysis
## Call: psych::alpha(x = climScept)
##
##   raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd
##       0.71       0.7    0.65      0.37 2.4 0.011 0.87 0.69
##
##  lower alpha upper     95% confidence boundaries
## 0.68 0.71 0.73
##
##  Reliability if an item is dropped:
```
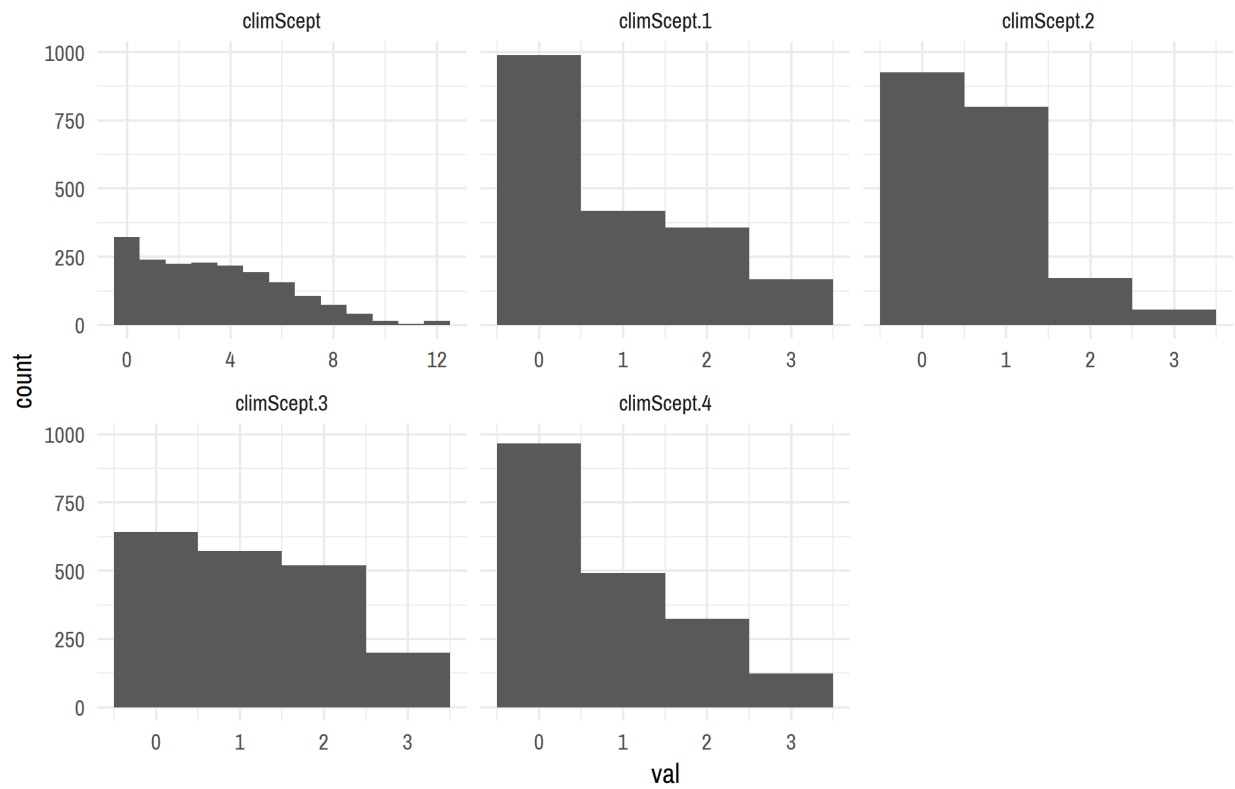
Figure 9: Independent variables. Climate change skepticism.

```
##               raw_alpha std.alpha G6(smc) average_r S/N alpha se
## climScept.1      0.65      0.65    0.56      0.38 1.9    0.013
## climScept.2      0.70      0.70    0.61      0.43 2.3    0.012
## climScept.3      0.61      0.61    0.52      0.34 1.6    0.015
## climScept.4      0.60      0.60    0.51      0.33 1.5    0.015
##
##  Item statistics
##                n raw.r std.r r.cor r.drop mean   sd
## climScept.1 1935  0.75  0.72  0.57   0.48 0.85 1.01
## climScept.2 1955  0.62  0.67  0.47   0.39 0.67 0.75
## climScept.3 1932  0.78  0.76  0.64   0.54 1.14 1.00
## climScept.4 1907  0.78  0.77  0.66   0.56 0.79 0.95
##
## Non missing response frequency for each item
##                0    1    2    3 miss
## climScept.1 0.51 0.22 0.19 0.09 0.03
## climScept.2 0.47 0.41 0.09 0.03 0.02
## climScept.3 0.33 0.30 0.27 0.10 0.03
## climScept.4 0.51 0.26 0.17 0.07 0.04
```

```
# alpha = 0.71
```

Environmental attitudes are captured with two variables reflecting whether an individual prefers environmental protection over the use of ressources and economic welfare, whereby high values are poled as being more environmental friendly:

- `attiEnvir.1`: Economic welfare vs. environmental protection
- `attiEnvir.2`: Use of natural ressources vs. protection of nature and landscape

```r
# Attitudes towards the environment, higher = more env. friendly
inev %>%
  gather("attiEnvirx", "val", starts_with("attiEnvir")) %>%
  ggplot(aes(x=val)) +
  geom_histogram(binwidth=1) +
  facet_wrap(~attiEnvirx, scales="free_x") +
  labs(title="Environmental attitude",
       subtitle="high values = more environmental friendly") +
  theme_minimal() +
  theme(text=element_text(family='Archivo Narrow'))

# Cronbachs' alpha
attiEnvir <- select(inev, starts_with("attiEnvir."))
psych::alpha(attiEnvir)
```
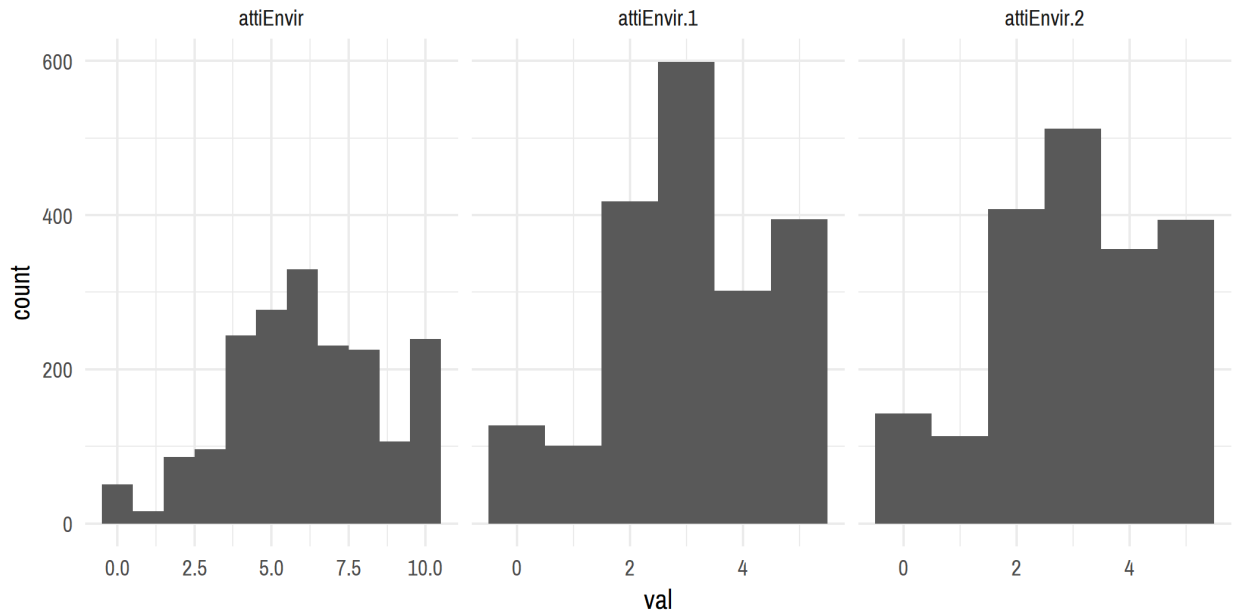
Figure 10: Independent variables. Environmental attitude.

```
##
## Reliability analysis
## Call: psych::alpha(x = attiEnvir)
##
##   raw_alpha std.alpha G6(smc) average_r S/N    ase mean  sd
##      0.67      0.67     0.5       0.5   2 0.015    3 1.3
##
##  lower alpha upper     95% confidence boundaries
## 0.64 0.67 0.7
##
##  Reliability if an item is dropped:
##            raw_alpha std.alpha G6(smc) average_r S/N alpha se
## attiEnvir.1      0.5       0.5    0.25       0.5  NA       NA
## attiEnvir.2      0.5       0.5    0.25       0.5  NA       NA
##
##  Item statistics
##               n raw.r std.r r.cor r.drop mean  sd
## attiEnvir.1 1942  0.87  0.87  0.61    0.5    3 1.4
## attiEnvir.2 1926  0.88  0.87  0.61    0.5    3 1.5
##
```

```
## Non missing response frequency for each item
##             0    1    2    3    4   5 miss
## attiEnvir.1 0.07 0.05 0.22 0.31 0.16 0.2 0.02
## attiEnvir.2 0.07 0.06 0.21 0.27 0.18 0.2 0.03

# alpha = 0.67


rm(climScept, attiEnvir)
```

Political ideology or more precisely party preference, lastly, is the party an individual did vote for in the National elections 2015, roughly half a year before the survey was conducted. We consider the four biggest parties and the two green parties.

```
# Party preference
inev %>%
  group_by(party) %>%
  summarise(count=n()) %>%
  ggplot(aes(x=reorder(party, -count), y=count)) +
  geom_bar(stat="identity") +
  labs(title="Party preference",
       subtitle="Party voted for in 2015 National elections",
       x="Party", y="Count") +
  theme_minimal() +
  theme(text=element_text(family='Archivo Narrow'),
        axis.text.x=element_text(angle=45,hjust=1))
```

3.3 Climate change skepticism and clusters

Before turning to the individual level models, the hypothesis that climate change skepticism is independent of political ideology is tested. Due to the ordered answers in climate change skepticism and the group of clusters, Chi-Squared Tests of Independence are conducted.

```
chisq.cc <- dplyr::select(inev, starts_with("climScept"), cluster) %>%
  gather("climScept", "answer", starts_with("climScept")) %>%
  split(.$climScept) %>%
  map(~chisq.test(.$answer, .$cluster))
chisq.cc
```

```
## $climScept
##
##  Pearson's Chi-squared test
##
## data:  .$answer and .$cluster
```

Party preference
Party voted for in 2015 National elections

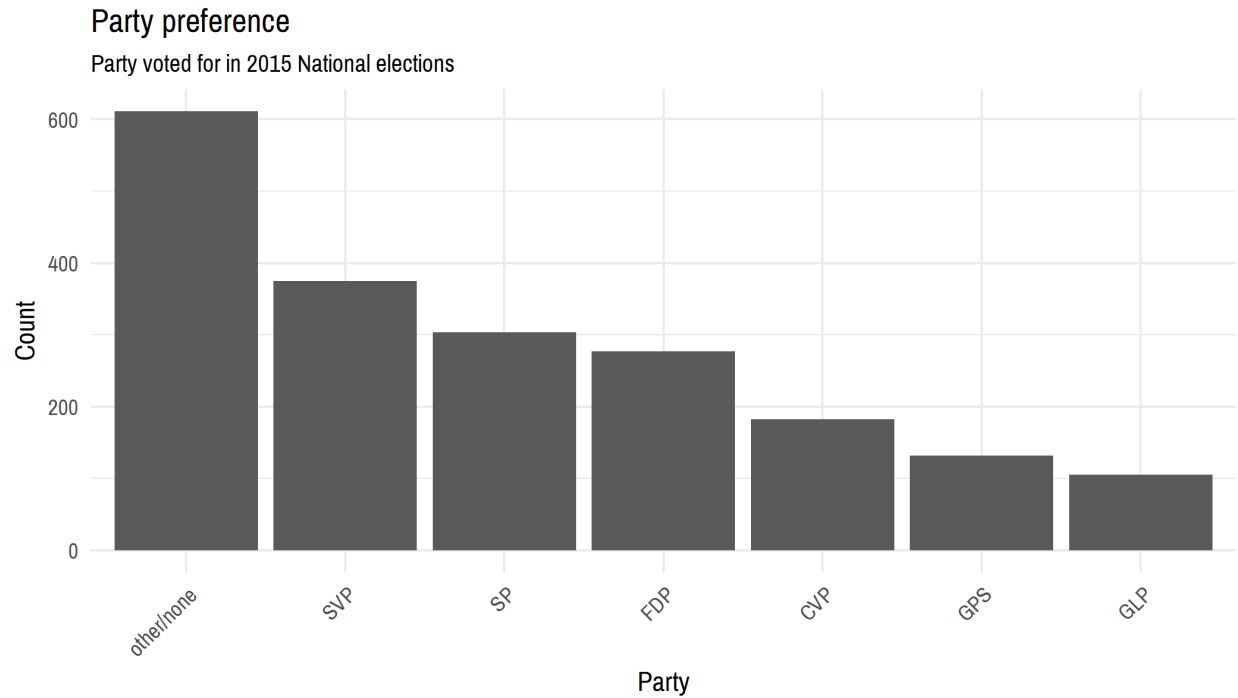Figure 11: Independent variables. Party preference.

```
## X-squared = 255.83, df = 48, p-value < 2.2e-16
##
##
## $climScept.1
##
##  Pearson's Chi-squared test
##
## data:   .$answer and .$cluster
## X-squared = 114.41, df = 12, p-value < 2.2e-16
##
##
## $climScept.2
##
##  Pearson's Chi-squared test
##
## data:   .$answer and .$cluster
## X-squared = 105.65, df = 12, p-value < 2.2e-16
##
##
## $climScept.3
```

```
## 
##  Pearson's Chi-squared test
## 
## data:  .$answer and .$cluster
## X-squared = 120.69, df = 12, p-value < 2.2e-16
## 
## 
## $climScept.4
## 
##  Pearson's Chi-squared test
## 
## data:  .$answer and .$cluster
## X-squared = 176.89, df = 12, p-value < 2.2e-16
```

```r
rm(chisq.cc)
```

The Chi-Squared tests show that for all four questions independently, as well as for the combined variable representing an overall score of climate change skepticism, the repartition is not independent from the clusters as computed through elite beliefs. This said, the hypothesis that climate change skepticism is independent from the political parties represented by those clusters can be rejected.

3.4   Individual level models

Having established that political ideology and climate change skepticism are not independent from each other, the question arises if those two variables lead to distinct perspectives on which policies are preferred or supported for the promotion of renewable energy sources. Moreover, the question arises whether or not climate change skepticisim is used as a reason to oppose energy transitions.

For this, structural equation modeling (SEM) is appropriate. First, they allow to construct latent variables such as opposition to renewable energy promotion or climate change skepticism based on several observed items. Second, path analysis enables to estimate both direct and indirect paths of influence of one concept on another. SEM therefore facilitate to investigate how political ideology and climate change skepticism are related with each other and with opposition. Figure 12 shows the setup of the model.

Three latent variables (ellipses) are estimated:

- Opposition towards the promotion of energy transitions, computed through seven observed variables representing the described policies (excluding the item 'no promotion'),
- Climate Change Skepticism, representing the four variables on opinion towards climate change,
- and Environmental Attitudes, based on the two variables on preferences for the environment.

As manifest variable, political ideology in form of political party preference is considered. With those four variables, three regressions will be estimated, each explaining a latent variable. In the regressions, gender, age, education and income will be included as control variables.
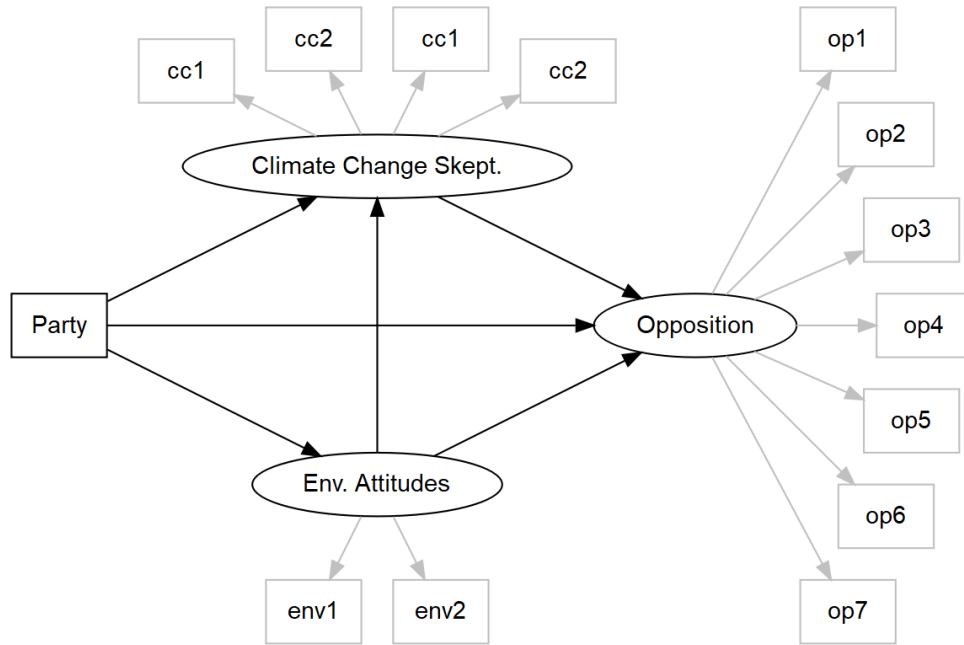
Figure 12: Path model.

3.4.1 Structural equation modeling

In order to be able to interpret the results more straightforward, a few operationalizations will be changed. First, instead of looking at support for policies, we recode the variables as representing opposition (1=opposition). Second, we create dummy variables for party, education and income.

```r
inev$pr.ban.on.non.renewables <- 1-inev$pr.ban.on.non.renewables
inev$pr.tax.reduction <- 1-inev$pr.tax.reduction
inev$pr.subsidy <- 1-inev$pr.subsidy
inev$pr.public.tendering <- 1-inev$pr.public.tendering
inev$pr.public.investments <- 1-inev$pr.public.investments
inev$pr.instructing.companies <- 1-inev$pr.instructing.companies
inev$pr.info.consulting.education <- 1-inev$pr.info.consulting.education

inev <- inev %>%
  mutate(p.v=as.numeric(party=="SVP"),
         p.s=as.numeric(party=="SP"),
         p.c=as.numeric(party=="CVP"),
         p.f=as.numeric(party=="FDP"),
         p.gl=as.numeric(party=="GLP"),
         p.g=as.numeric(party=="GPS"))
```

```r
inev <- inev %>%
  mutate(educ.l=as.numeric(educat=="low"),
         educ.h=as.numeric(educat=="high"),
         inco.l=as.numeric(incomecat=="low"),
         inco.h=as.numeric(incomecat=="high"),
         fr = as.numeric(language=="Français"),
         it = as.numeric(language=="Italiano"))


inev.na <- na.omit(select(inev, pr.ban.on.non.renewables, pr.tax.reduction,
                          pr.subsidy, pr.public.tendering,
                          pr.public.investments, pr.instructing.companies,
                          pr.info.consulting.education,
                          climScept.1, climScept.2, climScept.3, climScept.4,
                          attiEnvir.1, attiEnvir.2,
                          party, p.v, p.s, p.c, p.f, p.gl, p.g,
                          age, age2, female, educ.l, educ.h, inco.l, inco.h,
                          fr, it))
```

For estimation in the R-package `lavaan`, the following code describes the SEM. Notably, `op` is the latent variable representing opposition towards the promotion of energy transitions, `cc` is the latent variable representing climate change skepticism, and `env` is the latent variable representing attitudes towards the environment. Three regression models estimate those three latent variables with the main explaining variable of political ideology, included as dummies for party preference.

```r
full.model <- '
# Measurement
op =~ pr.ban.on.non.renewables + pr.tax.reduction + pr.subsidy +
  pr.public.tendering + pr.public.investments + pr.instructing.companies +
  pr.info.consulting.education

cc =~ climScept.1 + climScept.2 + climScept.3 + climScept.4

env =~ attiEnvir.1 + attiEnvir.2

# Models
env ~ a1.v*p.v + a1.s*p.s + a1.c*p.c +
  a1.f*p.f + a1.gl*p.gl + a1.g*p.g +
  female + inco.l + inco.h

cc ~ b1.v*p.v + b1.s*p.s + b1.c*p.c +
  b1.f*p.f + b1.gl*p.gl + b1.g*p.g +
  c*env + educ.l + educ.h + inco.l + inco.h
```

```
op ~ d.v*p.v + d.s*p.s + d.c*p.c +
  d.f*p.f + d.gl*p.gl + d.g*p.g +
  a2*env + b2*cc


# Indirect effects
v_cc_op := b1.v*b2
s_cc_op := b1.s*b2
c_cc_op := b1.c*b2
f_cc_op := b1.f*b2
gl_cc_op := b1.gl*b2
g_cc_op := b1.g*b2
'


fit.base <- sem(model=full.model, data=inev.na, estimator="mlm")
summary(fit.base, fit.measures=T)
```

```
## lavaan (0.5-23.1097) converged normally after  90 iterations
##
##   Number of observations                          1627
##
##   Estimator                                  ML      Robust
##   Minimum Function Test Statistic       475.201     470.188
##   Degrees of freedom                        180         180
##   P-value (Chi-square)                    0.000       0.000
##   Scaling correction factor                           1.011
##      for the Satorra-Bentler correction
##
## Model test baseline model:
##
##   Minimum Function Test Statistic      3424.124    3399.376
##   Degrees of freedom                        221         221
##   P-value                                 0.000       0.000
##
## User model versus baseline model:
##
##   Comparative Fit Index (CFI)             0.908       0.909
##   Tucker-Lewis Index (TLI)                0.887       0.888
##
##   Robust Comparative Fit Index (CFI)                  0.908
##   Robust Tucker-Lewis Index (TLI)                     0.888
##
```

```
## Loglikelihood and Information Criteria:
##
##    Loglikelihood user model (H0)              -27422.640  -27422.640
##    Loglikelihood unrestricted model (H1)      -27185.040  -27185.040
##
##    Number of free parameters                        67          67
##    Akaike (AIC)                              54979.281   54979.281
##    Bayesian (BIC)                            55340.712   55340.712
##    Sample-size adjusted Bayesian (BIC)       55127.865   55127.865
##
## Root Mean Square Error of Approximation:
##
##    RMSEA                                         0.032       0.031
##    90 Percent Confidence Interval       0.028  0.035       0.028  0.035
##    P-value RMSEA <= 0.05                         1.000       1.000
##
##    Robust RMSEA                                              0.032
##    90 Percent Confidence Interval                           0.028  0.035
##
## Standardized Root Mean Square Residual:
##
##    SRMR                                          0.032       0.032
##
## Parameter Estimates:
##
##    Information                                 Expected
##    Standard Errors                           Robust.sem
##
## Latent Variables:
##                    Estimate  Std.Err  z-value  P(>|z|)
##    op =~
##      pr.bn.n.nn.rnw     1.000
##      pr.tax.reductn     0.940    0.151    6.202    0.000
##      pr.subsidy         1.187    0.162    7.335    0.000
##      pr.pblc.tndrng     1.069    0.152    7.039    0.000
##      pr.pblc.nvstmn     1.038    0.142    7.292    0.000
##      pr.nstrctng.cm     1.063    0.139    7.627    0.000
##      pr.nf.cnsltng.     1.323    0.167    7.922    0.000
##    cc =~
##      climScept.1        1.000
##      climScept.2        0.615    0.046   13.452    0.000
```

```
##     climScept.3      1.118    0.056   19.917    0.000
##     climScept.4      1.055    0.053   19.824    0.000
##   env =~
##     attiEnvir.1      1.000
##     attiEnvir.2      0.843    0.049   17.345    0.000
##
## Regressions:
##                   Estimate  Std.Err  z-value  P(>|z|)
##   env ~
##     p.v    (a1.v)   -0.447    0.105   -4.261    0.000
##     p.s    (a1.s)    0.376    0.100    3.752    0.000
##     p.c    (a1.c)   -0.209    0.111   -1.882    0.060
##     p.f    (a1.f)   -0.532    0.106   -5.024    0.000
##     p.gl  (a1.gl)    0.479    0.127    3.781    0.000
##     p.g    (a1.g)    0.858    0.142    6.057    0.000
##     female           0.299    0.065    4.585    0.000
##     inco.l           0.151    0.087    1.731    0.084
##     inco.h          -0.236    0.075   -3.147    0.002
##   cc ~
##     p.v    (b1.v)    0.248    0.058    4.292    0.000
##     p.s    (b1.s)   -0.272    0.051   -5.331    0.000
##     p.c    (b1.c)   -0.041    0.059   -0.700    0.484
##     p.f    (b1.f)   -0.017    0.058   -0.295    0.768
##     p.gl  (b1.gl)   -0.266    0.070   -3.781    0.000
##     p.g    (b1.g)   -0.209    0.071   -2.949    0.003
##     env      (c)    -0.199    0.024   -8.299    0.000
##     educ.l           0.140    0.042    3.322    0.001
##     educ.h          -0.021    0.047   -0.456    0.648
##     inco.l           0.108    0.046    2.329    0.020
##     inco.h          -0.121    0.040   -3.041    0.002
##   op ~
##     p.v    (d.v)    -0.016    0.016   -1.020    0.308
##     p.s    (d.s)    -0.070    0.018   -3.814    0.000
##     p.c    (d.c)    -0.010    0.019   -0.511    0.609
##     p.f    (d.f)    -0.054    0.017   -3.247    0.001
##     p.gl  (d.gl)    -0.091    0.027   -3.371    0.001
##     p.g    (d.g)    -0.110    0.027   -4.097    0.000
##     env     (a2)    -0.011    0.007   -1.569    0.117
##     cc      (b2)     0.069    0.013    5.199    0.000
##
## Intercepts:
```

```
##                      Estimate  Std.Err  z-value  P(>|z|)
##    .pr.bn.n.nn.rnw      0.748    0.015   51.308    0.000
##    .pr.tax.reductn      0.643    0.015   41.568    0.000
##    .pr.subsidy          0.570    0.017   32.775    0.000
##    .pr.pblc.tndrng      0.677    0.016   42.520    0.000
##    .pr.pblc.nvstmn      0.646    0.016   40.892    0.000
##    .pr.nstrctng.cm      0.773    0.015   52.916    0.000
##    .pr.nf.cnsltng.      0.644    0.018   36.747    0.000
##    .climScept.1         0.822    0.051   15.990    0.000
##    .climScept.2         0.670    0.033   20.075    0.000
##    .climScept.3         1.101    0.056   19.529    0.000
##    .climScept.4         0.773    0.054   14.438    0.000
##    .attiEnvir.1         2.999    0.081   36.929    0.000
##    .attiEnvir.2         2.980    0.071   42.186    0.000
##    .op                  0.000
##    .cc                  0.000
##    .env                 0.000
##
## Variances:
##                      Estimate  Std.Err  z-value  P(>|z|)
##    .pr.bn.n.nn.rnw      0.184    0.006   31.646    0.000
##    .pr.tax.reductn      0.219    0.005   44.508    0.000
##    .pr.subsidy          0.219    0.005   40.271    0.000
##    .pr.pblc.tndrng      0.206    0.005   38.221    0.000
##    .pr.pblc.nvstmn      0.215    0.005   41.130    0.000
##    .pr.nstrctng.cm      0.171    0.006   28.593    0.000
##    .pr.nf.cnsltng.      0.203    0.006   32.967    0.000
##    .climScept.1         0.625    0.037   16.744    0.000
##    .climScept.2         0.423    0.019   22.692    0.000
##    .climScept.3         0.499    0.032   15.386    0.000
##    .climScept.4         0.434    0.026   16.543    0.000
##    .attiEnvir.1         0.655    0.079    8.282    0.000
##    .attiEnvir.2         1.131    0.075   15.081    0.000
##    .op                  0.017    0.004    4.799    0.000
##    .cc                  0.263    0.025   10.651    0.000
##    .env                 1.030    0.086   11.949    0.000
##
## Defined Parameters:
##                      Estimate  Std.Err  z-value  P(>|z|)
##    v_cc_op              0.017    0.005    3.339    0.001
##    s_cc_op             -0.019    0.005   -3.919    0.000
```

```
##     c_cc_op         -0.003    0.004    -0.694     0.488
##     f_cc_op         -0.001    0.004    -0.295     0.768
##     gl_cc_op        -0.018    0.006    -3.154     0.002
##     g_cc_op         -0.014    0.006    -2.558     0.011
```

In general, further models with control variables exhibited no added information compared to the presented model. Notably, the demographic control variables do not have a direct effect on opposition itself, highlighting how opposition is a concept largely influenced by political and environmental atittudes and beliefs, which are themselves subjected to demographic influence.

```r
pars <- parameterEstimates(fit.base)[
  parameterEstimates(fit.base)$op=='=~' |
  parameterEstimates(fit.base)$op=='~',]

pars$lhs <- recode_factor(pars$lhs,
                          "env"="Environmental Attitudes",
                          "cc"="Climate Change Skepticism",
                          "op"="Opposition")

pars$rhs <- recode_factor(pars$rhs,
                          "educ.h"="high education",
                          "educ.l"="low education",
                          "inco.h"="high income",
                          "inco.l"="low income",
                          "female"="female",
                          "cc"="Climate Change Skepticism",
                          "env"="Environmental Attitudes",
                          "p.g"="GPS",
                          "p.gl"="GLP",
                          "p.f"="FDP",
                          "p.c"="CVP",
                          "p.s"="SP",
                          "p.v"="SVP"
                          )

colnames(pars) <- c("LHS", "Op", "RHS", "label", "Estimate","Std.Err",
                    "z.value", "p.value", "ci.lower", "ci.upper")

pars.factors <- pars[pars$Op=='=~',]
pars.regressions <- pars[pars$Op=='~',]

pars.regressions$x <- c(1,2,3,4,5,6,9,12,13,
```

```
                           1,2,3,4,5,6,7,10,11,12,13,
                           1,2,3,4,5,6,7,8)
pars.regressions$RHS <- ifelse(
  pars.regressions$x %in% c(1,2,3,4,5,6,10,11,12,13),
  paste0("   ", pars.regressions$RHS),
  as.character(pars.regressions$RHS))

pars.regressions$RHS[pars.regressions$x==9] <- "Gender (female)"

pars.labels <- matrix(ncol=3, nrow=6)
pars.labels[,1] <- c(rep("Environmental Attitudes",2),
                     rep("Climate Change Skepticism",3),
                     "Opposition")
pars.labels[,2] <- c("Party preference (ref. other/none)",
                     "Income (ref. middle)",
                     "Party preference (ref. other/none)",
                     "Education (ref. middle)",
                     "Income (ref. middle)",
                     "Party preference (ref. other/none)")
pars.labels[,3] <- c(0.5,11.5,0.5,9.5,11.5,0.5)
pars.labels <- data.frame(pars.labels)
colnames(pars.labels) <- c("LHS", "RHS", "x")
pars.labels$x <- as.numeric(as.character(pars.labels$x))

pars.regressions <- pars.regressions %>%
  full_join(pars.labels, by=c("RHS","LHS","x"))
pars.regressions$LHS <- factor(pars.regressions$LHS,
                               levels=c("Environmental Attitudes",
                               "Climate Change Skepticism",
                               "Opposition"))

pars.regressions %>%
    ggplot() +
    geom_hline(yintercept=0, linetype=2, alpha=0.5) +
    geom_pointrange(aes(y=Estimate,
                        ymin=ci.lower, ymax=ci.upper,
                        x=reorder(RHS, -x))) +
    facet_wrap(~LHS, scales="free_x") +
    coord_flip() +
    labs(title="Structural equation model estimates",
         subtitle="Estimate and 95%-CI",
```
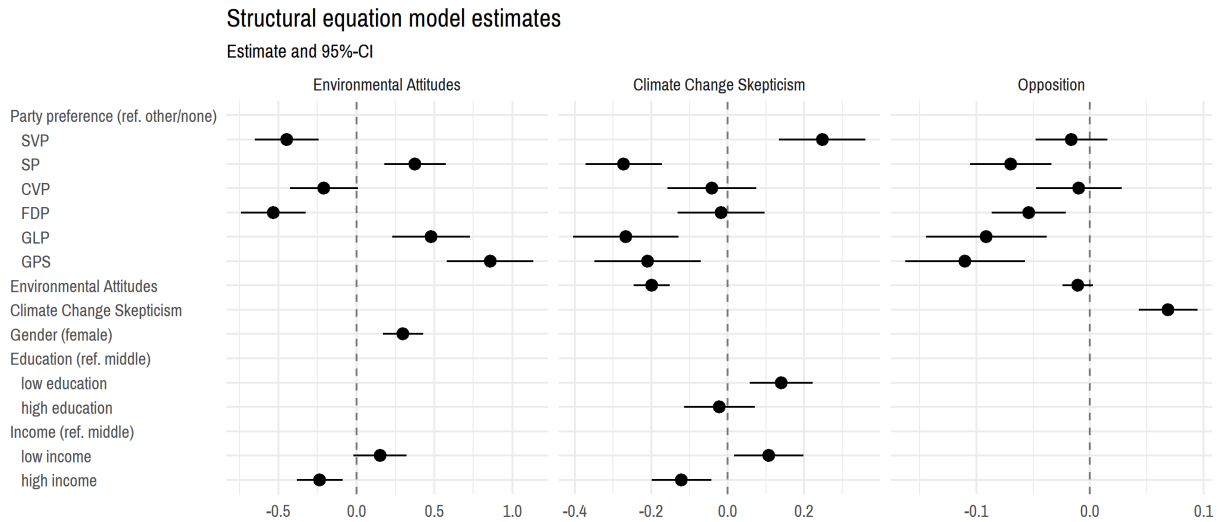
Figure 13: Structural equation model regression results.

```
        x="", y="") +
    theme_minimal() +
    theme(text=element_text(family='Archivo Narrow'),
        axis.text.y = element_text(hjust = 0))

ggsave(file = 'img/sem_regressions.png',
       width = 20, height = 10, units = 'cm')

pars.reghead <- matrix(ncol=5, nrow=4)
pars.reghead[,1] <- c("Environmental attitudes ~",
                      "Climate Change Skepticism ~",
                      "Opposition ~", "")
pars.reghead <- data.frame(pars.reghead, stringsAsFactors = F)
colnames(pars.reghead) <- c("RHS","Estimate","Std.Err","z.value", "p.value")

pars.regressions <- rbind(
    pars.reghead[1,],
    pars.regressions[1:9,c(3,5:8)],
    pars.reghead[2,],
    pars.regressions[10:20,c(3,5:8)],
    pars.reghead[3,],
    pars.regressions[21:28,c(3,5:8)]
)
```

```
pars.regressions$Estimate <- as.numeric(pars.regressions$Estimate)
pars.regressions$Std.Err <- as.numeric(pars.regressions$Std.Err)
pars.regressions$z.value <- as.numeric(pars.regressions$z.value)
pars.regressions$p.value <- as.numeric(pars.regressions$p.value)

stargazer(pars.factors[,c(1:3,5:6)], summary=FALSE, type='html',
          rownames=FALSE, initial.zero=FALSE,
          digits=3, title='Factor loadings',
          out="results/sem_factors.html")

stargazer(pars.regressions, summary=FALSE, type='html',
          rownames=FALSE, initial.zero=FALSE,
          digits=3, title='Regressions',
          out="results/sem_regs.html")
```

3.5   A closer look at the latent variables

The used R package lavaan allows to extract the predicted latent variables for opposition, climate change skepticism and environmental attitudes. A closer look at those latent variables by party preference allow for further insights how those concepts are influenced political preferences.

```
ltv.pred <- lavPredict(fit.base)

inev.na <- cbind(inev.na, ltv.pred)

inev.na %>%
  select(party, op, cc, env) %>%
  rename(Opposition=op, "Climate Change Skepticism"=cc,
         "Environmental attitudes"=env) %>%
  gather("latvar", "value", -party) %>%
  mutate(party = factor(party,
                   levels=c("GPS","GLP","SP","CVP",
                             "FDP","SVP","other/none"))) %>%
  ggplot(aes(party, value, color=party), alpha=0.7) +
    geom_dotplot(binaxis='y', stackdir='center',
                 dotsize=0.5) +
    facet_wrap(~latvar, ncol=1, scales="free") +
    labs(title="Latent variables by party",
         x="Party", y="") +
    scale_color_manual(values=c("forestgreen","lawngreen",
                                "firebrick","orange","darkblue",
```

```
                            "yellowgreen","grey"),
                 guide=F) +
    theme_minimal() +
    theme(text=element_text(family='Archivo Narrow'))
```

```
inev.na %>%
  select(party, op, cc, env) %>%
  rename(Opposition=op, "Climate Change Skepticism"=cc,
         "Environmental attitudes"=env) %>%
  gather("latvar", "value", -party) %>%
  mutate(party = factor(party,
                   levels=c("GPS","GLP","SP","CVP",
                            "FDP","SVP","other/none"))) %>%
  ggplot(aes(party, value)) +
    geom_boxplot() +
    facet_wrap(~latvar, ncol=1, scales="free") +
    labs(title="Latent variables by party",
         x="Party", y="") +
    theme_minimal() +
    theme(text=element_text(family='Archivo Narrow'))
```

```
sessionInfo()
```

```
## R version 3.4.2 (2017-09-28)
## Platform: x86_64-w64-mingw32/x64 (64-bit)
## Running under: Windows 10 x64 (build 16299)
##
## Matrix products: default
##
## locale:
## [1] LC_COLLATE=German_Switzerland.1252  LC_CTYPE=German_Switzerland.1252
## [3] LC_MONETARY=German_Switzerland.1252 LC_NUMERIC=C
## [5] LC_TIME=German_Switzerland.1252
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
##  [1] bindrcpp_0.2       extrafont_0.17     corrplot_0.84
##  [4] DiagrammeR_0.9.2   lavaan_0.5-23.1097 Hmisc_4.0-3
##  [7] Formula_1.2-2      survival_2.41-3    lattice_0.20-35
## [10] psych_1.7.8        ggdendro_0.1-20    tableHTML_1.1.0
```
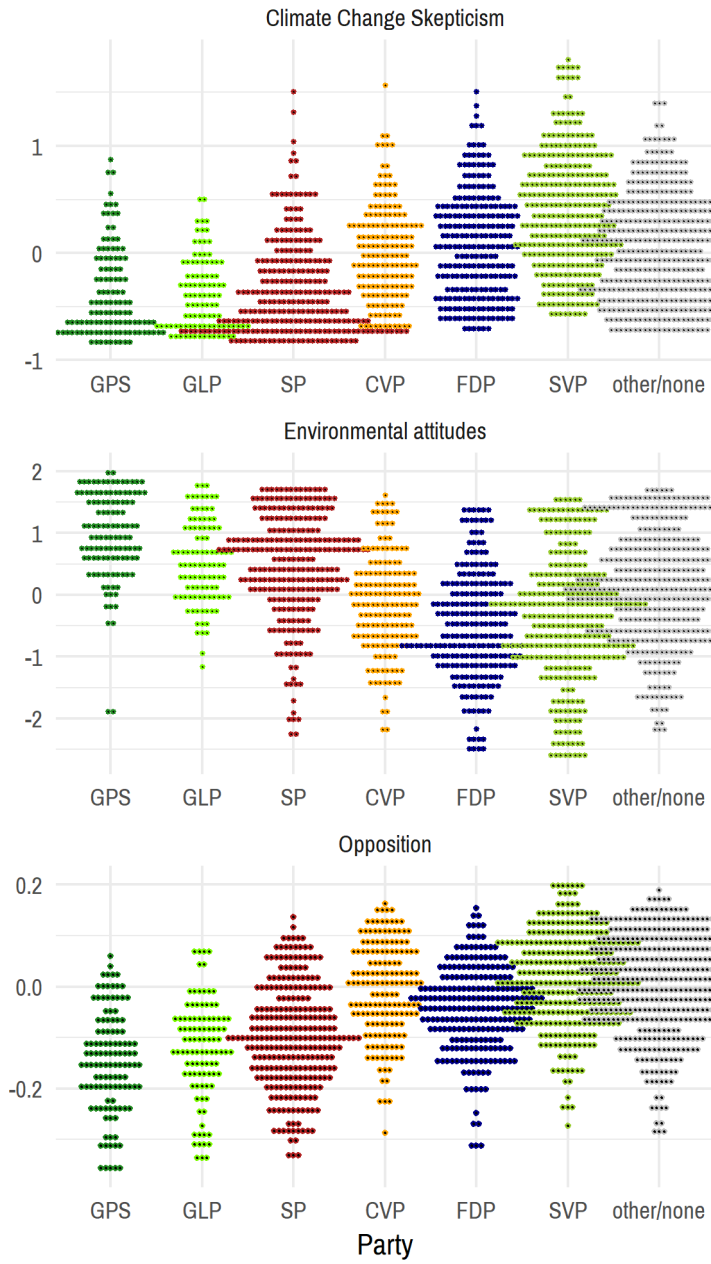
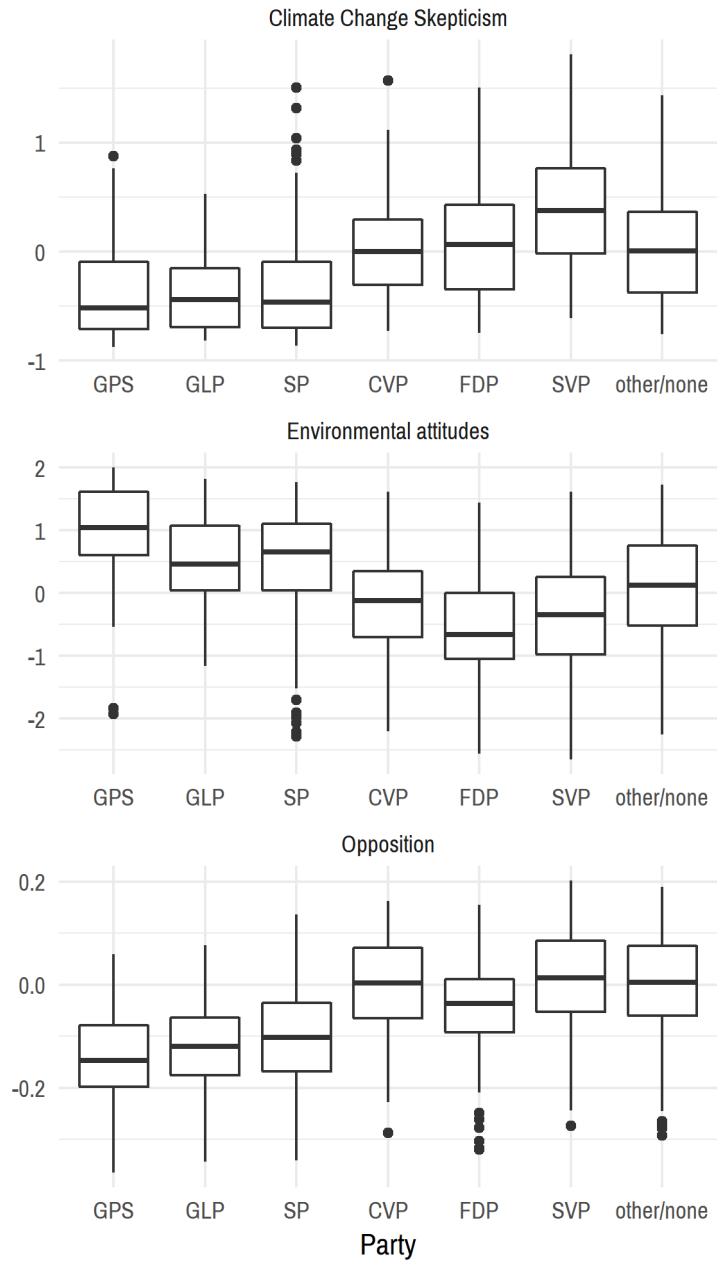Figure 14: Latent variables by political ideology

Figure 15: Latent variables by political ideology

```
## [13] NbClust_3.0         cluster_2.0.6        pvclust_2.0-0
## [16] factoextra_1.0.5    dplyr_0.7.4          purrr_0.2.4
## [19] readr_1.1.1         tidyr_0.7.2          tibble_1.3.4
## [22] ggplot2_2.2.1       tidyverse_1.1.1      pacman_0.4.6
##
## loaded via a namespace (and not attached):
##  [1] nlme_3.1-131        lubridate_1.7.1     RColorBrewer_1.1-2
##  [4] httr_1.3.1          rprojroot_1.2       tools_3.4.2
##  [7] backports_1.1.1     R6_2.2.2            rpart_4.1-11
## [10] lazyeval_0.2.1      colorspace_1.3-2    nnet_7.3-12
## [13] tidyselect_0.2.3    gridExtra_2.3       mnormt_1.5-5
## [16] extrafontdb_1.0     compiler_3.4.2      rvest_0.3.2
## [19] htmlTable_1.9       xml2_1.1.1          influenceR_0.1.0
## [22] labeling_0.3        bookdown_0.5        scales_0.5.0
## [25] checkmate_1.8.5     quadprog_1.5-5      stringr_1.2.0
## [28] digest_0.6.12       pbivnorm_0.6.0      foreign_0.8-69
## [31] rmarkdown_1.6       base64enc_0.1-3     pkgconfig_2.0.1
## [34] htmltools_0.3.6     htmlwidgets_0.9     rlang_0.1.4
## [37] readxl_1.0.0        rstudioapi_0.7      bindr_0.1
## [40] visNetwork_2.0.1    jsonlite_1.5        acepack_1.4.1
## [43] rgexf_0.15.3        magrittr_1.5        Matrix_1.2-11
## [46] Rcpp_0.12.13        munsell_0.4.3       viridis_0.4.0
## [49] stringi_1.1.5       yaml_2.1.14         MASS_7.3-47
## [52] plyr_1.8.4          grid_3.4.2          parallel_3.4.2
## [55] ggrepel_0.7.0       forcats_0.2.0       haven_1.1.0
## [58] splines_3.4.2       hms_0.3             knitr_1.17
## [61] ggpubr_0.1.5        igraph_1.1.2        reshape2_1.4.2
## [64] stats4_3.4.2        XML_3.98-1.9        glue_1.2.0
## [67] evaluate_0.10.1     downloader_0.4      latticeExtra_0.6-28
## [70] data.table_1.10.4-3 modelr_0.1.1        Rttf2pt1_1.3.6
## [73] cellranger_1.1.0    gtable_0.2.0        assertthat_0.2.0
## [76] broom_0.4.2         viridisLite_0.2.0   Rook_1.1-1
## [79] brew_1.0-6
```