H1: Corruption reduces the strength of state environmental programs.

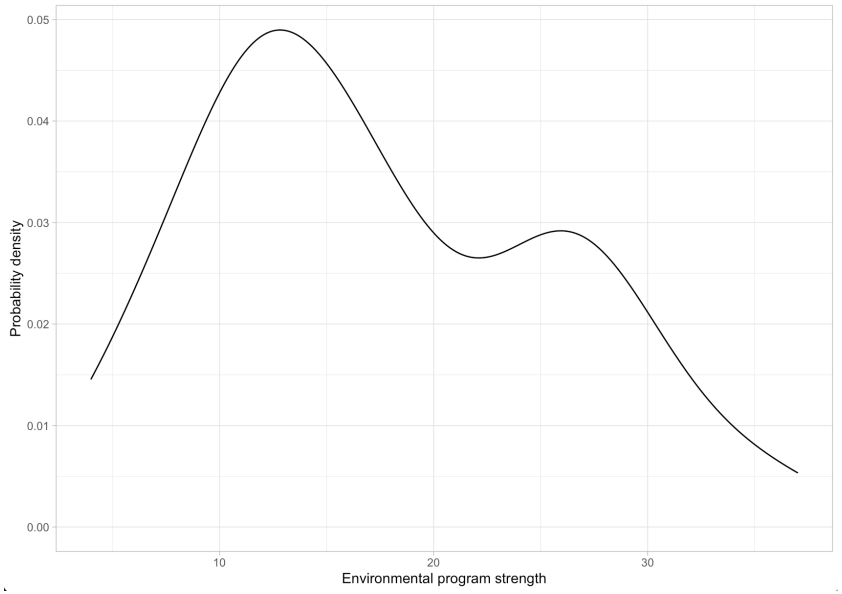
Statistical Evidence: Negative effect of corruption in model that explains variation in environmental policy strength.

Outcome: Strength of a state's environmental program

Focal Predictor: Corruption measure

$$\widehat{\text{EnvProgStr}}_i = \beta_0 + \beta_1(\text{Corruption}_i) + \epsilon_i$$

Figure 1. Density plots of environmental policy strength and political corruption.



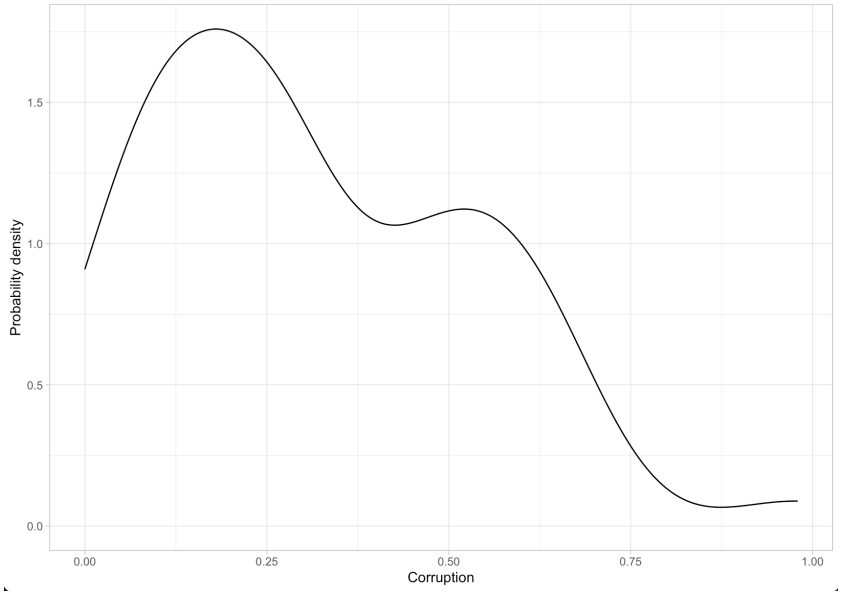
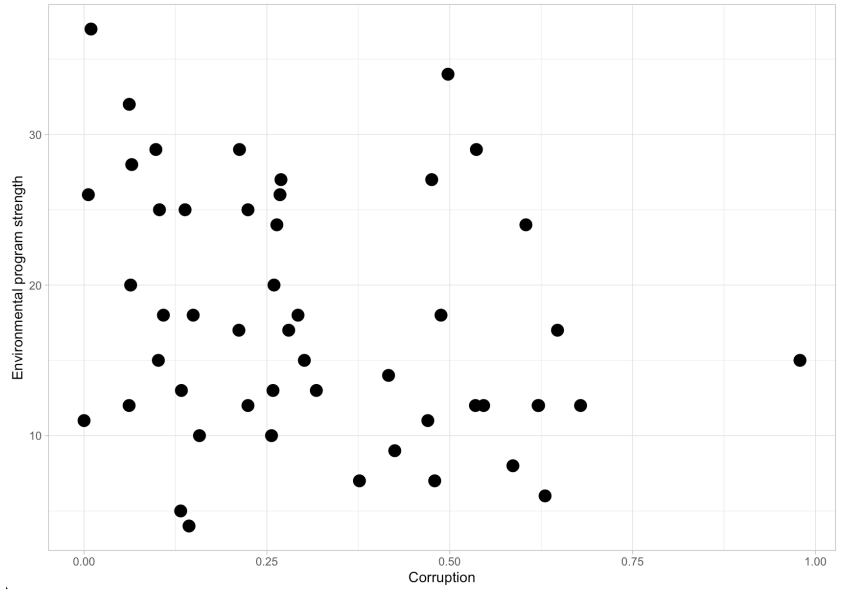
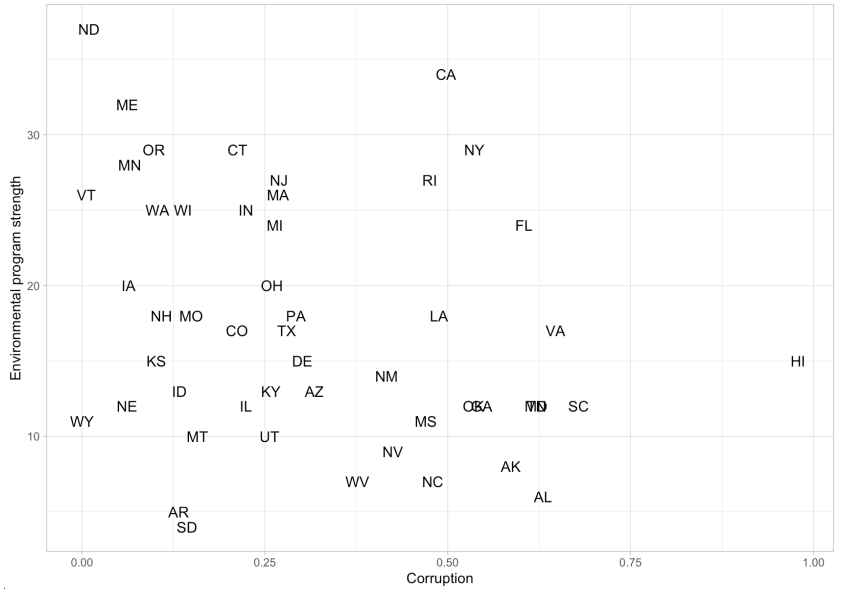


Figure 2. Scatterplots of environmental policy strength versus political corruption.





Each 1-unit increase in political corruption is associated with a 9.95-unit decrease in environmental policy strength, on average. This effect is not statically different than 0 (p = .060).

In the standardized model there is no intercept!

Predictor	Unstandardized	Standardized
Corruption	–9.95 (5.17)	–.27 (.14)
Intercept	20.74 (1.99)	—
RMSE	8.01	0.96
R^2	.072	0.72

Each 1-SD increase in political corruption is associated with a .27-SD decrease in environmental policy strength, on average. This effect is not statically different than 0 (p = .060).

H1: Corruption reduces the strength of state environmental programs (re-visited).

PRIOR RESEARCH

States with greater financial resources can afford to spend more on environmental protection.

Covariate(s): Wealth

States with severe environmental problems are expected to have stronger environmental programs.

Covariate(s): Toxic Waste Severity

State environmental programs may also be affected by the political context in the state.

Covariate(s): Democratic Party Control;
Interparty Competition

States environmental policy is responsive to public opinion.

Covariate(s): Public Environmentalism

Table 1. Summary statistics for the unstandardized outcome, focal predictor, and five covariates.

Variable	*M*	*SD*	*Min.*	*Max.*
Environmental policy strength	17.6	8.23	4	37
Corruption	.32	.22	0	.98
Wealth	28.15	36.38	12.78	278.01
Toxic waste severity	3.53	1.14	0	5.76
Democratic control	.63	.26	0	1
Interparty competition	39.03	11.40	9.26	56.58
Public environmentalism	2.49	.10	2.31	2.7

Table 2. Pairwise correlations between the outcome, focal predictor, and five covariates.

Variable	1	2	3	4	5	6	7
1. Environmental policy strength	1.00						
2. Corruption	–.27	1.00					
3. Wealth	.27	–.15	1.00				
4. Toxic waste severity	–.02	.12	–.12	1.00			
5. Democratic control	.08	.41	.06	.05	1.00		
6. Interparty competition	.52	–.34	.13	–.24	–.28	1.00	
7. Public environmentalism	.42	.22	–.01	.04	.18	.12	1.00

Statistical Evidence: Negative effect of corruption in main-effects model that accounts for the set of covariates.

$$\widehat{\text{EnvProgStr}}_i = \beta_1(\text{Corruption}_i) + \beta_2(\text{Wealth}_i) + \beta_3(\text{Toxic Waste}_i) + \beta_4(\text{Dem. Party}_i) + \beta_5(\text{Interparty Comp.}_i) + \beta_6(\text{PublicEnv.}_i) + \epsilon_i$$

Since we are using the standardized outcome/ predictors in the model there is no intercept!

	term	estimate	std.error	statistic	p.value
	<chr>	<dbl>	<dbl>	<dbl>	<dbl>
1	corrupt	-0.2877375	0.1225644	-2.347643	0.02356416
2	wealth	0.1695099	0.1068410	1.586562	0.1199393
3	toxic_waste	0.1164442	0.1100273	1.058321	0.2958183
4	dem_party_control	0.2419123	0.1186659	2.038600	0.04766883
5	interparty_comp	0.4566051	0.1199214	3.807535	0.0004404563
6	public_env	0.3836419	0.1102135	3.480899	0.001159370

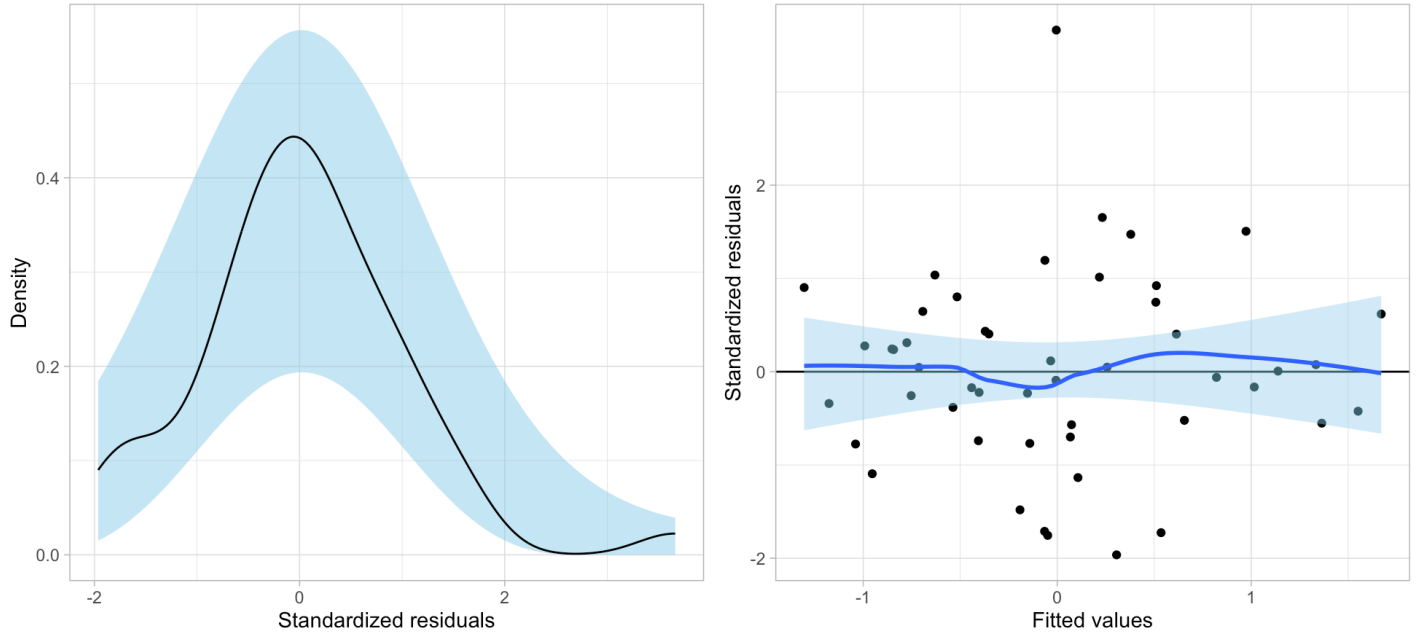
Because prior research/theory suggested the covariates should be included in the model, we will keep them in the model (and report them) regardless of statistical significance!

Table 3. Standardized regression coefficients (and SEs) for a set of models predicting variation in environmental policy strength.

Predictor	Model 1	Model 2
Corruption	–.27 (.14)	–.29 (.12)
Wealth		.17 (.11)
Toxic waste severity		.12 (.13)
Democratic control		.24 (.12)
Interparty competition		.45 (.12)
Public environmentalism		.38 (.11)
RMSE	.96	.73
R^2	.072	.537

In Model 2, each 1-SD increase in political corruption is associated with a .29-SD decrease in environmental policy strength, on average, after controlling for the other predictors in the model (p = .024).

Figure 3. Residual plots for the Model 2. LEFT: Density plot of the standardized residuals. The confidence envelope for a normal reference distribution (blue shaded area) is also displayed. RIGHT: Scatterplot of the standardized residuals versus the fitted values. The line Y=0 (black), confidence envelope for the line Y=0 (blue shaded area) and the loess smoother (blue) are also displayed.



H2: Political corruption may be greater in states where industry is better organized for political action.

States environmental policy is responsive to the strength of manufacturing interests.

Covariate(s): Manufacturing Groups

Moreover, the effect of corruption may be different depending on the strength of manufacturing interests.

Interaction: Corruption x Manufacturing Groups

Statistical Evidence: Significant interaction between corruption and manufacturing groups, after accounting for the set of covariates.

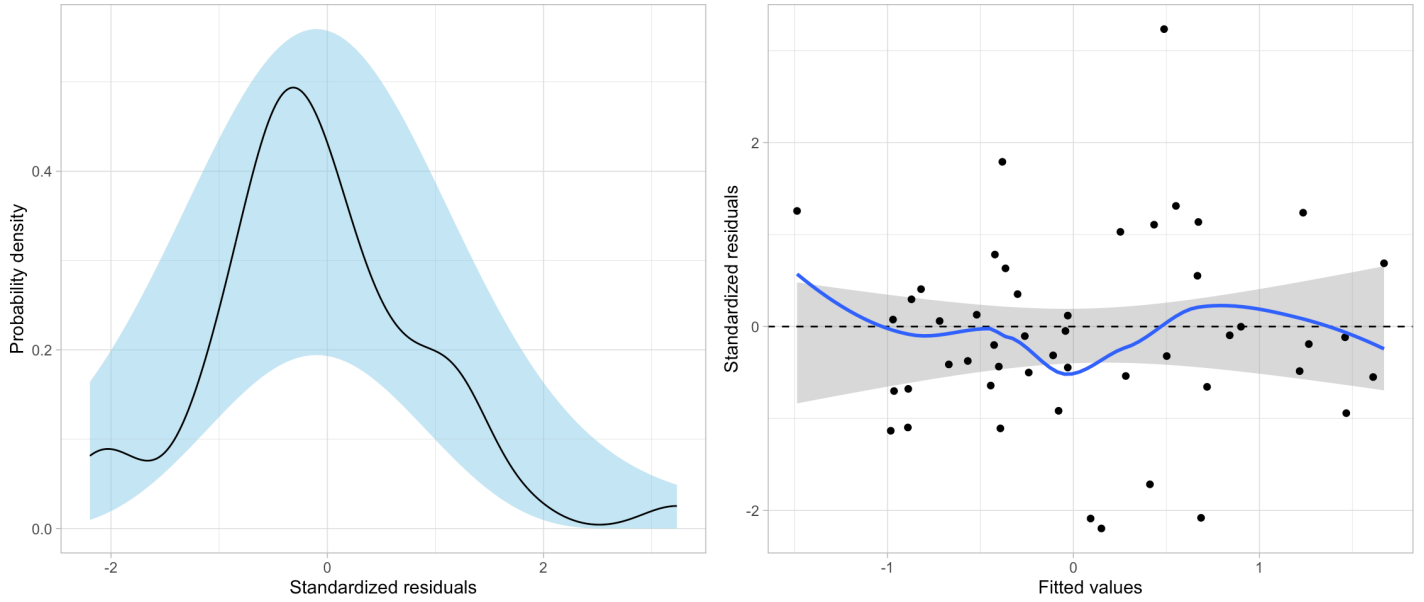
$$\begin{aligned}\text{EnvProgStr}_i = &\beta_0 + \beta_2(\text{Corruption}_i) + \beta_3(\text{Wealth}_i) + \beta_4(\text{Toxic Waste}_i) + \\ &\beta_5(\text{Dem. Party}_i) + \beta_6(\text{Interparty Comp.}_i) + \beta_7(\text{PublicEnv.}_i) + \\ &\beta_8(\text{Manuf. Grp.}) + \beta_9(\text{Corruption}_i)(\text{Manuf. Grp.}) + \epsilon_i\end{aligned}$$

Table 3. Standardized regression coefficients (and SEs) for a set of models predicting variation in environmental policy strength.

Predictor	Model 3
Corruption	–.39 (.12)
Wealth	.11 (.11)
Toxic waste severity	.0006 (.13)
Democratic control	.24 (.11)
Interparty competition	.49 (.11)
Public environmentalism	.31 (.11)
Manufacturing groups	–.38 (.14)
Corruption x Manufacturing groups	–.21 (.12)
RMSE	.68
R^2	.613

The interaction effect (p = .083) suggests that the effect of political corruption may be different in states where industry is better organized for political action.

Figure 3. Residual plots for the Model 3. LEFT: Density plot of the standardized residuals. The confidence envelope for a normal reference distribution (blue shaded area) is also displayed. RIGHT: Scatterplot of the standardized residuals versus the fitted values. The line Y=0 (black), confidence envelope for the line Y=0 (blue shaded area) and the loess smoother (blue) are also displayed.



Interpreting the Interaction by Plotting It

We will plot environmental policy strength (*y*-axis) versus political corruption (*x*-axis) for two different levels of manufacturing organization (say +1 and –1).

To do this, we will set the other covariates to their mean value. (Reminder: If you have dummy variables, you would set those to 0 or 1 rather than the mean!)

Bonus: Since we are dealing with standardized variables, the means will be 0! That means all those effects will drop out when we simplify the model.

$$\widehat{\text{EnvProgStr}}_i = -.39(\text{Corruption}_i) - .38(\text{Manuf. Grp.}) - .21(\text{Corruption}_i)(\text{Manuf. Grp.})$$

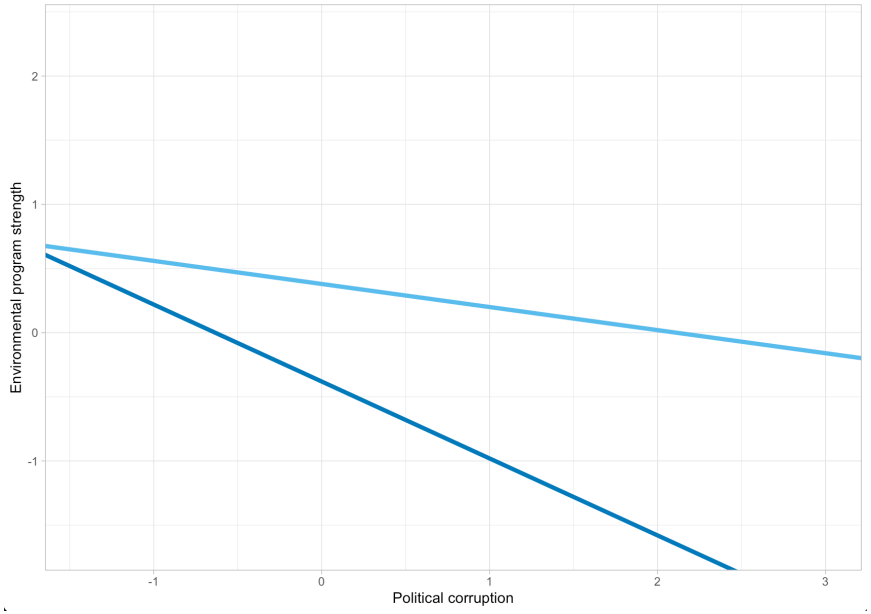
Below average manufacturing interest in the state (Manuf. Gap = –1)

$$\begin{aligned}\widehat{\text{EnvProgStr}}_i &= -.39(\text{Corruption}_i) - .38(-1) - .21(\text{Corruption}_i)(-1) \\ &= .38 - .18(\text{Corruption}_i)\end{aligned}$$

Above average manufacturing interest in the state (Manuf. Gap = +1)

$$\begin{aligned}\widehat{\text{EnvProgStr}}_i &= -.39(\text{Corruption}_i) - .38(1) - .21(\text{Corruption}_i)(1) \\ &= -.38 - .60(\text{Corruption}_i)\end{aligned}$$

Figure 3. Predicted environmental policy strength as a function of political corruption for states with a **below average** amount of manufacturing interest and **above average** amount of manufacturing interest.



The effect of political corruption depends on the level of manufacturing interest in the state.

The effect of political corruption on environmental program strength is more negative the higher amount of manufacturing interest in the state.

H3: Political corruption may be greater in states where environmental interest groups are better organized for political action.

States environmental policy is responsive to the strength of environmental interests.

Covariate(s): Environmental Groups

Moreover, the effect of corruption may be different depending on the strength of environmental interests.

Interaction: Corruption x Environmental Groups

Statistical Evidence: Significant interaction between corruption and environmental groups, after accounting for the set of covariates.

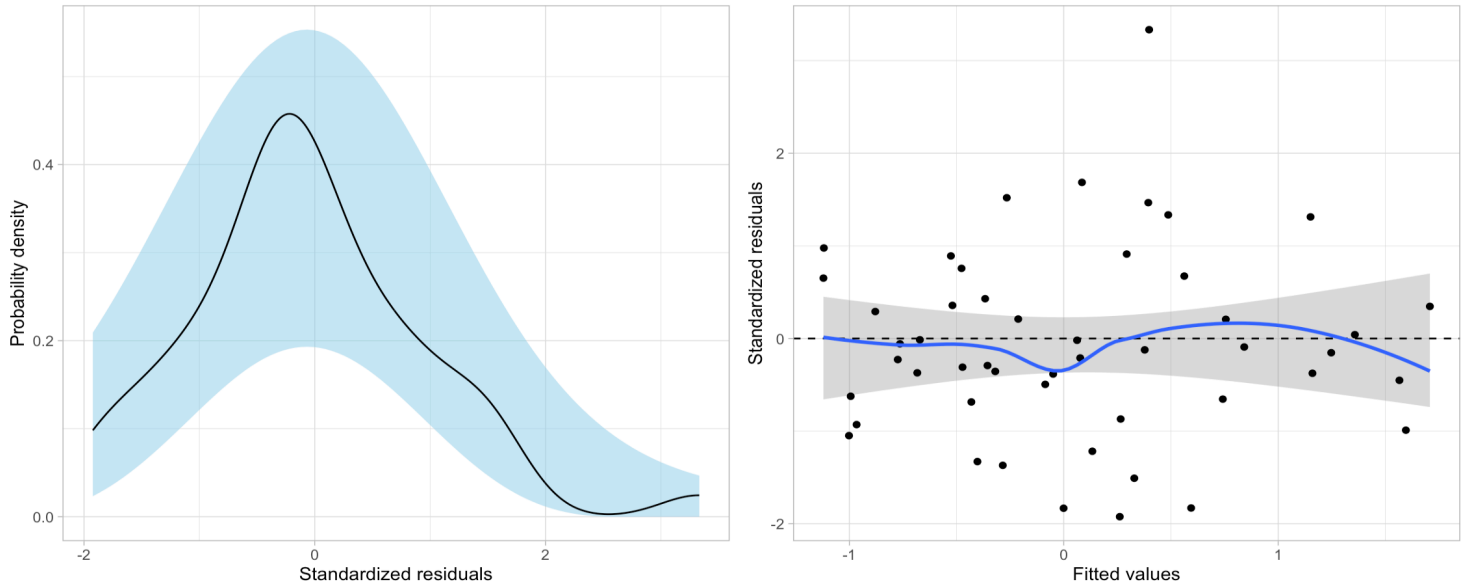
$$\begin{aligned}\text{EnvProgStr}_i = &\beta_1(\text{Corruption}_i) + \beta_2(\text{Wealth}_i) + \beta_3(\text{Toxic Waste}_i) + \\ &\beta_4(\text{Dem. Party}_i) + \beta_5(\text{Interparty Comp.}_i) + \beta_6(\text{PublicEnv.}_i) + \\ &\beta_7(\text{Env. Grp.}) + \beta_8(\text{Corruption}_i)(\text{Env. Grp.}) + \epsilon_i\end{aligned}$$

Table 3. Standardized regression coefficients (and SEs) for a set of models predicting variation in environmental policy strength.

Predictor	Model 4
Corruption	–.34 (.12)
Wealth	.15 (.10)
Toxic waste severity	.02 (.13)
Democratic control	.23 (.11)
Interparty competition	.47 (.12)
Public environmentalism	.36 (.11)
Environmental groups	–.30 (.18)
Corruption x Environmental groups	–.20 (.16)
RMSE	.720
R^2	.567

The interaction effect (p = .221) suggests that the effect of political corruption likely is NOT different in states where environmental interests are better organized for political action.

Figure 3. Residual plots for the Model 4. LEFT: Density plot of the standardized residuals. The confidence envelope for a normal reference distribution (blue shaded area) is also displayed. RIGHT: Scatterplot of the standardized residuals versus the fitted values. The line Y=0 (black), confidence envelope for the line Y=0 (blue shaded area) and the loess smoother (blue) are also displayed.



Answer the RQs

The results from fitting Models 1 and 2 suggest that corruption reduces the strength of state environmental programs. This negative effect persists, even after accounting for differences in financial resources, severity of environmental problems, political context, and responsiveness to public opinion.

We also find that political corruption may be greater in states where industry is better organized for political action. The significant interaction between political corruption and manufacturing group interest in Model 3 indicates the effect of political corruption on environmental program strength is more negative for states with more manufacturing interest groups.

Lastly, the results from fitting Model 4 suggest that this same interaction is not observed in states with more environmental interest groups. The non-significant interaction between political corruption and environmental group interest indicates the effect of political corruption on environmental program strength is not any different for states with more environmental interest groups.

Consider your computer files and your organization of those files…

- Are your files organized into folders/directories? Or are they all in your Downloads folder?
- How did you organize all the data files, notes, etc. from EPsy 8251?
- If I asked you to find a specific file, could you locate it without using "Search"?
- Can you tell what is in a particular file by just looking at its name?
- Do your file names contain spaces? What about characters that aren't letters, numbers, dashes, or underscores?
- Are your file names consistent (all lower case letters, or all title case)? Or are they all different?