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Citizen Attitudes Toward Traditional and State Authorities: Substitutes or Complements?

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Supplementary Material:

Citizen Attitudes towards Traditional and State Authorities:

Substitutes or Complements?

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Appendix A: Additional Summary Information

Table A1 provides summary information for the variables used in this study, in addition to the information already provided in **Table 1** and **Table 2**.

Table A1. Additional Summary Information

Level	Description	Obs.	Mean	St. Dev.	Min	Max
Chief	Manage local conflict	3,535	0.440	0.496	0	1
Activities	Manage conflict between villages	3,550	0.218	0.413	0	1
	Manage external conflict	3,545	0.157	0.363	0	1
	Managed stealing problems	3,580	0.458	0.498	0	1
	Managed marriage problems	3,575	0.540	0.498	0	1
	Managed local violence	3,535	0.400	0.490	0	1
	Managed social violence	3,575	0.575	0.494	0	1
	Conduct wedding/ baptism/ etc.	3,500	0.076	0.265	0	1
	Other	3,480	0.353	0.478	0	1
Individual characteristics	Age (in decades)	3,639	4.118	1.462	1.8	10.4
	Literate	3,713	0.575	0.495	0	1
	Male	3,713	0.511	0.500	0	1

Notes: Data and instruments are available online:
<https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/BSASJR>

Appendix B: Variable Definitions

Table A2 gives a description of all variables used in this study. It also indicates the level at which the variable is measured, and the question number in the household survey.

Table A2. Variable Definitions

Variable	Description	Level	Q
Accept elections results	Binary. Mentions “accepting election results” to the question: What are the responsibilities of the government (at the chieftaincy/ sector / ETD level) in their relations with citizens?	Individual	Q78a
React to complaints	Binary. Mentions “reacting to citizen complaints” to the question: What are the responsibilities of the government (at the chieftaincy/ sector / ETD level) in their relations with citizens?	Individual	Q78b
React to suggestions	Binary. Mentions “reacting to suggestions” to the question: What are the responsibilities of the government (at the chieftaincy/ sector / ETD level) in their relations with citizens?	Individual	Q78c
Avoid corruption	Binary. Mentions “avoiding corruption” to the question: What are the responsibilities of the government (at the chieftaincy/ sector / ETD level) in their relations with citizens?	Individual	Q78d
Keep people informed	Binary. Mentions “keeping people informed” to the question: What are the responsibilities of the government (at the chieftaincy/ sector / ETD level) in their relations with citizens?	Individual	Q78e
Consult population	Binary. Mentions “consulting the population” to the question: What are the responsibilities of the government (at the chieftaincy/ sector / ETD level) in their relations with citizens?	Individual	Q78f
Contribute resources	Binary. Mentions “contributing resources” to the question: What are the responsibilities of the government (at the chieftaincy/ sector / ETD level) in their relations with citizens?	Individual	Q78g
Vote	Binary. Mentions “voting” to the question: What are the responsibilities of citizens in their relations with the state (at the chieftaincy/ sector / ETD level)?	Individual	Q77a
Complain	Binary. Mentions “complaining” to the question: What are the responsibilities of citizens in their relations with the state (at the chieftaincy/ sector / ETD level)?	Individual	Q77b
Make suggestions	Binary. Mentions “making a suggestion” to the question: What are the responsibilities of citizens in their relations with the state (at the chieftaincy/ sector / ETD level)?	Individual	Q77c
Attend meetings	Binary. Mentions “attending meetings” to the question: What are the responsibilities of citizens in their relations with the state (at the chieftaincy/ sector / ETD level)?	Individual	Q77d
Obeys the law	Binary. Mentions “obeying the law” to the question: What are the responsibilities of citizens in their relations with the state (at the chieftaincy/ sector / ETD level)?	Individual	Q77e
Pay Tax	Binary. Mentions “paying tax” to the question: What are the	Individual	Q77f

	responsibilities of citizens in their relations with the state (at the chieftaincy/ sector / ETD level)?		
Support government	Binary. Is “supporting the government” an important responsibilities of citizens in their relations with the state (at the chieftaincy/ sector / ETD level)?	Individual	Q77g
Providing education	Binary. Are you of the opinion that the actions taken by the government in providing education are of great value?	Individual	Q76e
Providing health care	Binary. Are you of the opinion that the actions taken by the government in providing health care are of great value?	Individual	Q76e
Contact police	Binary. In the past six months, did you contact the police, the army, or the courts about some of the problems you had?	Individual	Q79f
Visit to government agency	Binary. In the past six months, did you meet or contacted other government officials about some problems you had?	Individual	Q79g
Beneficiary choice	Binary. Imagine that your village receives funding for a small group of people or for special cases (for example, the most vulnerable, ethnic minorities or people with disabilities). A decision must be made to identify the members of this small group and distribute the funds among them. In your opinion, who should decide on the identification of this small group of people?	Individual	QD2
Fund allocation	Binary. Imagine that the community receives funding to finance several development projects in the community. A decision must be made on the allocation of these funds between the different projects. Who should have the greatest influence on whose funds are allocated?	Individual	QD6
Project supervision	Binary. In your opinion, who should supervise the implementation of these projects? Mentions the chief.	Individual	QD7
Rainfall shock	Continuous and positive. The absolute difference in the average of rainfall in mm. in the year prior to the survey and the 30 years before that.	Village	NA
Conflict shock	Continuous and positive. The absolute difference in the average of rainfall in mm. in the year prior to the survey relative to the historical (1948-2000) average.	Village	NA
Manage local conflict	Binary. In the last 3 months, did the chief manage land conflict between villagers?	Individual	CQ57
Manage conflict between villages	In the last 3 months, did the chief manage land conflict between villagers and villagers from a nearby village in the same locality?	Individual	CQ58
Manage external conflict	Binary. In the last 3 months, did the chief manage land conflicts between village residents and members of other villages in different localities?	Individual	CQ59
Managed stealing problems	Binary. In the last 3 months, did the chief managed theft problems?	Individual	CQ60
Managed marriage problems	Binary. In the last 3 months, did the chief managed marital problems?	Individual	CQ61
Managed local	Binary. In the last 3 months, did the chief manage problems of	Individual	CQ62

violence	violence between the inhabitants of the village?		
Managed social violence	Binary. In the last 3 months, did the chief manage social problems between families in the village?	Individual	CQ63
Conduct wedding/ baptism/ etc.	Binary. In the last 3 months, did the chief conduct a wedding, baptism, or other celebration?	Individual	CQ73
Other	Binary. In the last 3 months, did the chief undertake other village activities?	Individual	CQ74
Age	Continuous. Age of the respondent in decades.	Individual	QF9
Literate	Binary. Respondent can read and write.	Individual	QF13
Male	Binary. Respondent is male.	Individual	QF12

Notes: Question number responds to survey. Data and instruments are available online: <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/BSASJR>.

Appendix C: Attrition and Missing Responses

Below, we discuss attrition and missing responses in more detail. We aimed to collect information from 1,120 villages. We collected household survey data in 816 villages. In Haut Katanga, we visited 286 of the 296 targeted villages. In South Kivu, we visited 288 of the 298 targeted villages. In Tanganyika, we visited 207 of the 232 targeted villages. We were unable to reach most of these villages for security reasons. In Maniema, we collected data in only 35 of the targeted 294 villages, as our survey teams were expelled from the entire province because of political tensions prior to the 2011 elections.

In each visited village, we aimed to collect five household surveys. Given the 816 visited villages, we should have 4,080 respondents. **Table 1** and **Table 2** show that the number of actual observations used for analyses is lower. For example, for our measure “Accept elections results” only 3,734 of the targeted 4,080 household surveys (91.5%) were collected. First, we did not collect data from five households in all the visited villages. In total, we collected data from 3,881 households due to the realities of field work, including water damage to paper surveys, theft of tablets, and surveyor error in the implementation of surveys. Second, additional missing data – beyond the 3,881 households – is question-specific, resulting from question-specific recording or implementation issues. Given the Congo’s difficult operating environment, losing less than 10% of data would seem quite respectable. Unfortunately, we do not have detailed information for responses coded “Don’t know”, “Not applicable” or “Refuses to respond.”

Finally, we assess whether the villages in our sample are different from those where we were unable to collect data. For the 304 not-visited villages, we were able to obtain GPS

information for 207 villages.¹ To check for systematic bias, we regress village attrition on our rainfall and conflict shock variables. The results suggest that the probability of village attrition is unrelated to rainfall or conflict shocks.² The apparent absence of attrition bias is not surprising as the major reason for data loss (Maniema province) was political. We note, however, that those villages visited and those not visited may be different on other dimensions.

¹ Note that because the villages were not visited we do not have a date stamp, which is necessary to create the rainfall and conflict shocks. In response, we imputed values as the mean date for the chiefdom, and where missing we imputed dates as the mean date of all visited villages.

² We control for fixed effects at the chiefdom level. Results: Beta (standard error) for rainfall shock: 0.006 (0.008), and for conflict shock: 0.011 (0.006).

Appendix D: Full Structural Model Definition

Below we present the structural model used in Stan to estimate equations (2) to (5), with random effects at the chiefdom level.

```
model_lre <- "  
// Pearson Correlation  
data {  
  int<lower=0> n;  
  int<lower=0> k;  
  int<lower=0> d;  
  vector[2] x[n];  
  vector[n] rain;  
  vector[n] confl;  
  int chiefdom[n];  
  int idv[n];  
}  
parameters {  
  real<lower=0.1>          CES;  
  vector<lower=0.001>[2]  omega;  
  real<lower=-.999,upper=.999> r;  
  real  a_g;  
  real  b_g;  
  real  g_g;  
  real  a_c;  
  real  b_c;  
  real  g_c;  
  real <lower=0.001> omega_fe_g;  
  vector[d] fe_g;  
  real <lower=0.001> omega_fe_c;  
  vector[d] fe_c;  
}  
  
transformed parameters {  
  cov_matrix[2] Omega;  
  // Reparameterization  
  Omega[1,1] = square(omega[1]);  
  Omega[1,2] = r * omega[1] * omega[2];  
  Omega[2,1] = r * omega[1] * omega[2];  
  Omega[2,2] = square(omega[2]);  
}  
  
model {  
  vector[2]  s[n];  
  vector[n]  v_g;  
  vector[n]  v_c;
```

```

v_c = exp(a_c + b_c*rain + g_c*confl);
v_g = exp(a_g + b_g*rain + g_g*confl);

for (j in 1:n) {
s[j,1] = (v_c[j]^(CES))/(v_c[j]^(CES-1) + v_g[j]^(CES-1)) +
fe_c[chiefdom[j]] ;
s[j,2] = (v_g[j]^(CES))/(v_c[j]^(CES-1) + v_g[j]^(CES-1)) +
fe_g[chiefdom[j]] ;
} ;

// Chiefdom level
fe_g ~ normal( 0, omega_fe_g);
fe_c ~ normal(0, omega_fe_c);

// Data
x ~ multi_normal( s, Omega);
}
"

```

Next, we present the structural model used in Stan to estimate equations (2) to (5), with random effects at the chiefdom and the village level.

```

model_2re <- "
// Pearson Correlation
data {
int<lower=0> n;
int<lower=0> k;
int<lower=0> d;
vector[2] x[n];
vector[n] rain;
vector[n] confl;
int chiefdom[n];
int idv[n];
int idv_chef[k];
}
parameters {
real<lower=0.1> CES;
vector<lower=0.001>[2] omega;
real<lower=-.999,upper=.999> r;
real a_g;
real b_g;
real g_g;
real a_c;
real b_c;

```

```

real g_c;

real <lower=0.001> omega_fe_g;
real <lower=0.001> omega_re_g;
vector[d] fe_g;
vector[k] re_g;

real <lower=0.001> omega_fe_c;
real <lower=0.001> omega_re_c;
vector[d] fe_c;
vector[k] re_c;
}

transformed parameters {

cov_matrix[2] Omega;

// Reparameterization
Omega[1,1] = square(omega[1]);
Omega[1,2] = r * omega[1] * omega[2];
Omega[2,1] = r * omega[1] * omega[2];
Omega[2,2] = square(omega[2]);

}

model {
vector[2] s[n];
vector[n] v_g;
vector[n] v_c;

v_c = exp(a_c + b_c*rain + g_c*confl);
v_g = exp(a_g + b_g*rain + g_g*confl);

for (j in 1:n) {
s[j,1] = (v_c[j]^(CES))/(v_c[j]^(CES-1) + v_g[j]^(CES-1)) +
fe_c[chiefdom[j]] + re_c[idv[j]] ;
s[j,2] = (v_g[j]^(CES))/(v_c[j]^(CES-1) + v_g[j]^(CES-1)) +
fe_g[chiefdom[j]] + re_g[idv[j]] ;
} ;

// Model
// IDV RE level

re_c ~ normal( 0, omega_re_c);
re_g ~ normal(0, omega_re_g);

```

```
// Chiefdom level
  fe_g ~ normal( 0, omega_fe_g);
  fe_c ~ normal(0, omega_fe_c);

// Data
  x ~ multi_normal( s, Omega);
}
"
```

Appendix E: Relationship Modern and Traditional Contracts. By Individual Indicator

Table A3 to **Table A14** show the correlation between the ties between citizens and the state, and between citizens and traditional authority. We thus reproduce outcomes in **Table 4** assessing the Desired role of chief as development broker for each individual indicator. In all regressions, we used fixed effects at the chieftom level and standard errors are clustered at the village level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed). Variable definitions are in Table A2.

First, we present the results for responsibilities of the state:

Table A3: Responsibilities of the State and Chief Beneficiary Choose

	Accept elections results	React to complaints	React to suggestions	Avoid corruption	Keep people informed	Consult population	Contribute resources
Beneficiary Choice	-0.02* (0.01)	-0.03* (0.02)	-0.05*** (0.02)	-0.08*** (0.02)	-0.03* (0.01)	-0.04** (0.02)	0 (0.02)
N	3508	3508	3508	3508	3508	3508	3508
R2	0.05	0.06	0.08	0.05	0.05	0.04	0.05

Table A4. Responsibilities of the State and Chief Fund Allocation

	Accept elections results	React to complaints	React to suggestions	Avoid corruption	Keep people informed	Consult population	Contribute resources
Fund Allocation	-0.05*** (0.01)	-0.08*** (0.02)	-0.07*** (0.02)	-0.1*** (0.02)	-0.06*** (0.01)	-0.05*** (0.02)	0 (0.02)
N	3508	3508	3508	3508	3508	3508	3508
R2	0.06	0.06	0.08	0.06	0.05	0.04	0.05

Table A5. Responsibilities of the State and Chief Project Supervision

	Accept elections results	React to complaints	React to suggestions	Avoid corruption	Keep people informed	Consult population	Contribute resources
Project Supervision	-0.04*** (0.01)	-0.05*** (0.02)	-0.07*** (0.02)	-0.08*** (0.02)	-0.07*** (0.02)	0 (0.02)	0 (0.02)
N	3508	3508	3508	3508	3508	3508	3508
R2	0.05	0.06	0.08	0.05	0.05	0.04	0.05

Second, we present the results for responsibilities of citizens:

Table A6: Responsibilities of Citizens and Chief Beneficiary Choose

	Vote	Complain	Make suggestions	Attend meetings	Obey the law	Pay tax	Support government
Beneficiary Choice	-0.05*** (0.02)	-0.02 (0.02)	-0.04*** (0.01)	-0.04*** (0.01)	0 (0.02)	-0.01 (0.02)	-0.02 (0.01)
FE	Y	Y	Y	Y	Y	Y	Y
N	3507	3507	3507	3507	3507	3507	3507
R2	0.05	0.03	0.03	0.04	0.06	0.05	0.04

Table A7. Responsibilities of Citizens and Chief Fund Allocation

	Vote	Complain	Make suggestions	Attend meetings	Obey the law	Pay tax	Support government
Fund Allocation	-0.07*** (0.02)	-0.06*** (0.02)	-0.05*** (0.01)	-0.05*** (0.01)	-0.02 (0.02)	-0.01 (0.02)	0 (0.01)
N	3507	3507	3507	3507	3507	3507	3507
R2	0.05	0.03	0.03	0.04	0.06	0.05	0.04

Table A8. Responsibilities of Citizens and Chief Project Supervision

	Vote	Complain	Make suggestions	Attend meetings	Obey the law	Pay tax	Support government
Project Supervision	-0.06*** (0.02)	-0.04*** (0.02)	-0.04*** (0.01)	-0.04*** (0.01)	-0.04** (0.02)	-0.03** (0.02)	0 (0.01)
N	3507	3507	3507	3507	3508	3507	35
R2	0.05	0.03	0.03	0.04	0.06	0.05	0.04

Third, we present the results for valuation of the state:

Table A9: Valuation of the State and Chief Beneficiary Choose

	Providing education	Providing health care
Beneficiary Choice	-0.02* (0.01)	-0.03** (0.01)
N	3477	3465
R2	0.05	0.04

Table A10. Valuation of the State and Chief Fund Allocation

	Providing education	Providing health care
Fund	-0.01	-0.01
Allocation	(0.01)	(0.01)
N	3477	3465
R2	0.05	0.04

Table A11. Valuation of the State and Chief Project Supervision

	Providing education	Providing health care
Project	-0.04***	-0.02**
Supervision	(0.01)	(0.01)
N	3477	3465
R2	0.05	0.04

Finally, we present the results for citizen activities:

Table A12: Valuation of the State and Chief Beneficiary Choice

	Contact police	Visit to government agency
Beneficiary	0	-0.01
Choice	(0.01)	(0.01)
N	3495	3506
R2	0.05	0.04

Table A13. Valuation of the State and Chief Fund Allocation

	Contact police	Visit to government agency
Fund	-0.01	-0.01
Allocation	(0.01)	(0.01)
N	3495	3506
R2	0.05	0.04

Table A14. Valuation of the State and Chief Project Supervision

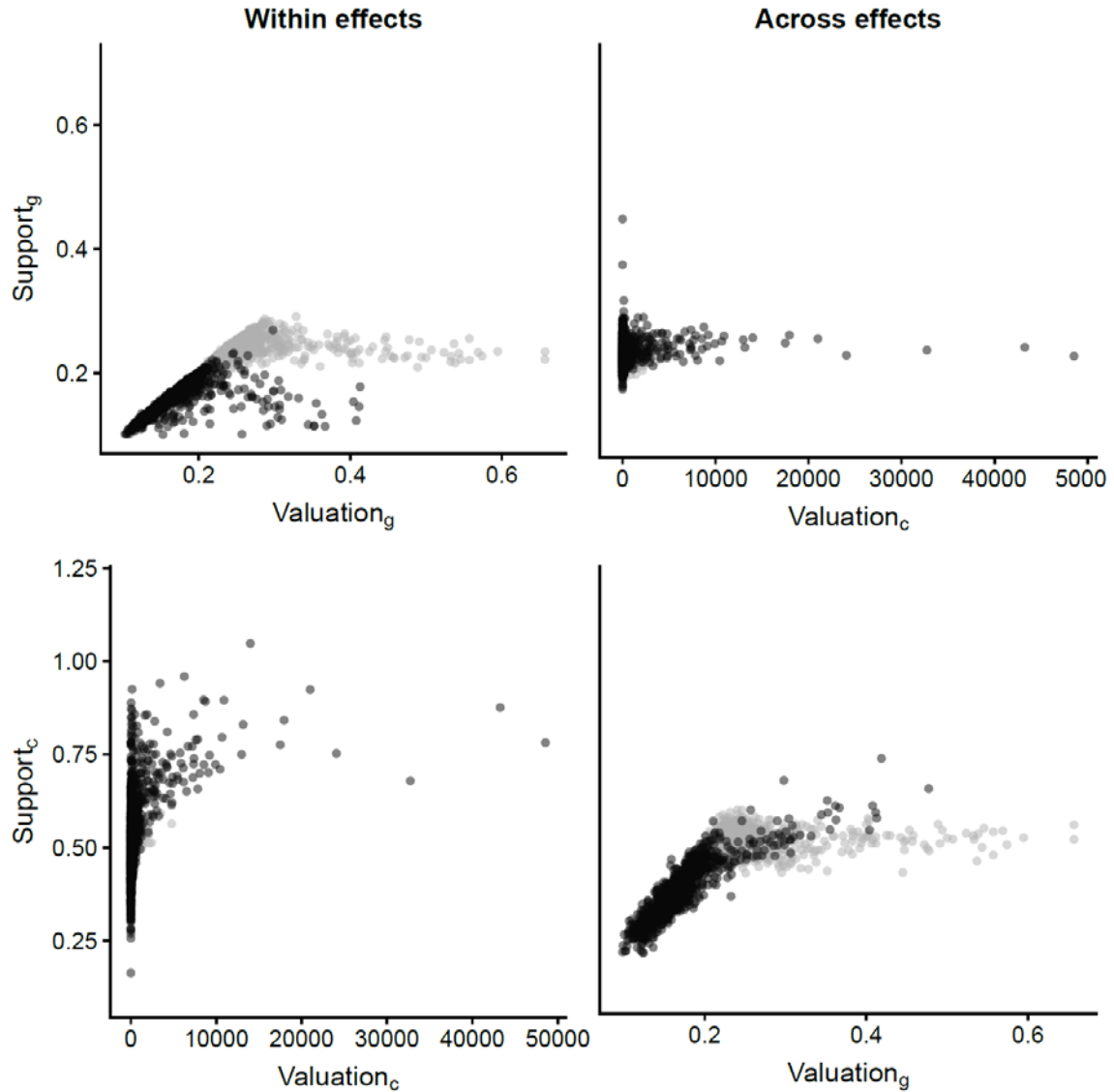
	Contact police	Visit to government agency
Project	0	-0.01
Supervision	(0.01)	(0.01)
N	3495	3506
R2	0.05	0.04

Appendix F: Graphical Representation of Channels for Rain Shocks

Figure A1 plots the values of valuation and support for traditional and modern authorities for rainfall shocks, where light and dark gray dots indicate small and large shocks respectively.

For example, the top left panel of **Figure A1** shows that a rainfall shock has a negative impact on the valuation of the government. That is, comparing the light and dark gray dots across the bottom axis, we find that, compared to large shocks, small shocks lead to high valuation of the government. Next, focusing on both axes, we find that higher valuations of the government leads to more support for the government. Combined, see **Table 6**, the within effect equals -0.08 with a credibility interval of (-0.15, -0.02).

Figure A1. Mediation Effects of Valuation on Support for Rainfall Shocks



Notes: Values based on small (large) shocks are light (dark) gray dots. Based on 1,000 simulations using equations (2) to (5).

Appendix G: Mediation Analysis Results for Conflict Shocks

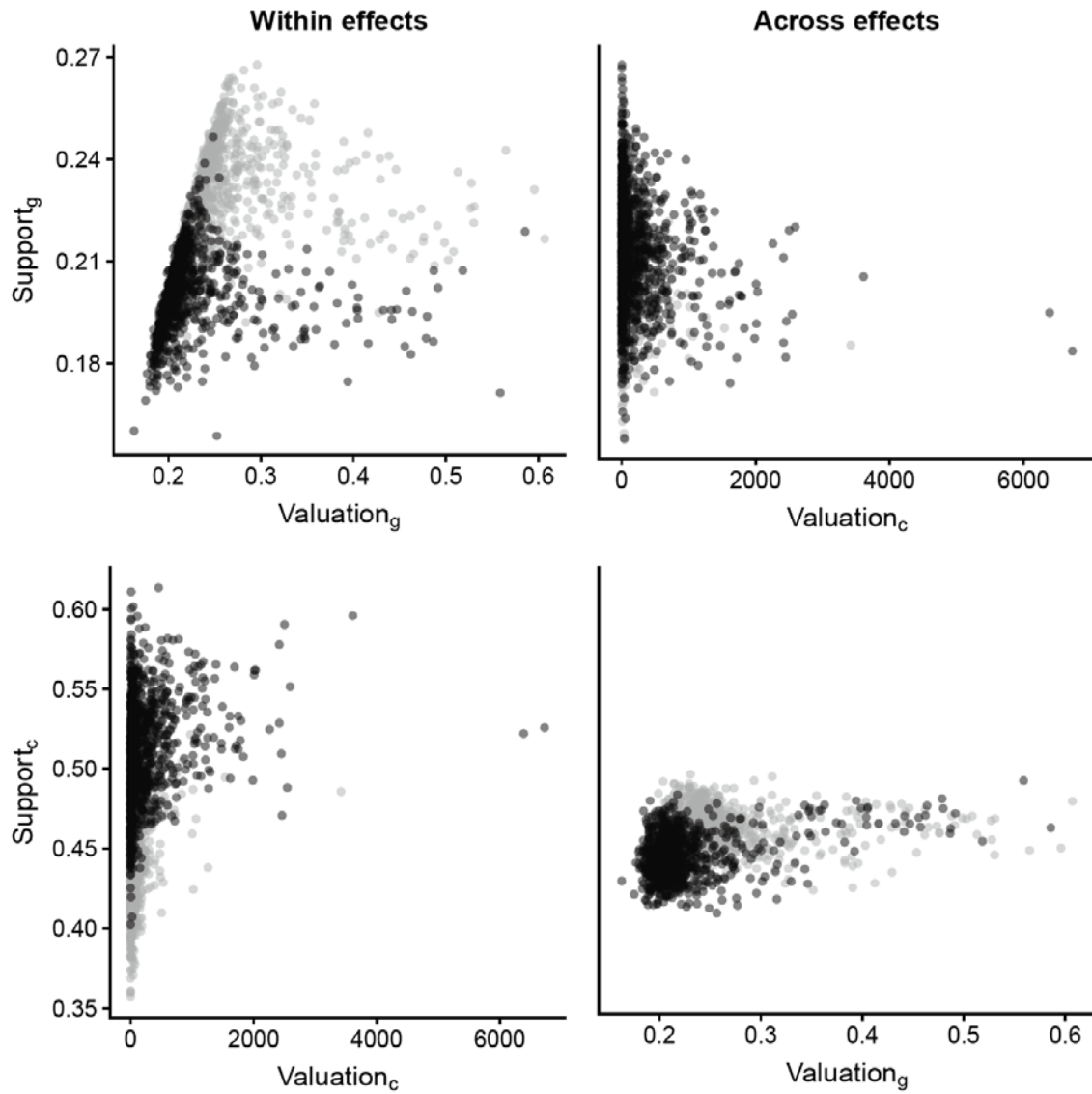
Table A15 and Figure A2 produces the same results for conflict shocks.

Table A15. The Impact of Complementarity: Within and Across Effects

	Within	Across
Support for the state	-0.027 (-0.05, -0.005)	0.003 (-0.006, 0.018)
Support for the traditional authorities	0.07 (0.006, 0.127)	-0.043 (-0.08, 0.004)

Note: Estimates of indirect effects from a change in conflict on support for the state and traditional authorities that operate via within or across authority mechanisms. Credibility intervals in parenthesis.

Figure A2. Mediation Effects of Valuation on Support for Conflict Shocks



Notes: Values based on small (large) shocks are light (dark) gray dots. Based on 1,000 simulations using equations (2) to (5).