**Supplementary Material:**

**Citizen Attitudes towards Traditional and State Authorities:**

**Substitutes or Complements?**

Peter van der Windt (NYU Abu Dhabi)

Macartan Humphreys (Columbia University, WZB)

Lily Medina (WZB)

Jeffrey F. Timmons (NYU Abu Dhabi)

Maarten Voors (Wageningen University & Research)

**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 | Age (in decades) | 3,639 | 4.118 | 1.462 | 1.8 | 10.4 |
| characteristics | 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 |
| Obey 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 responsibilities of citizens in their relations with the state (at the chieftaincy/ sector / ETD level)? | Individual | Q77f |
| 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 violence | Binary. In the last 3 months, did the chief manage problems of violence between the inhabitants of the village? | Individual | CQ62 |
| 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]](#footnote-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]](#footnote-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.

**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\_1re <- "// Pearson Correlationdata { 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;// ReparameterizationOmega[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 Correlationdata { 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;// ReparameterizationOmega[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 chiefdom 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\* | -0.03\* | -0.05\*\*\* | -0.08\*\*\* | -0.03\* | -0.04\*\* | 0 |
| (0.01) | (0.02) | (0.02) | (0.02) | (0.01) | (0.02) | (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\*\*\* | -0.08\*\*\* | -0.07\*\*\* | -0.1\*\*\* | -0.06\*\*\* | -0.05\*\*\* | 0 |
| (0.01) | (0.02) | (0.02) | (0.02) | (0.01) | (0.02) | (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\*\*\* | -0.05\*\*\* | -0.07\*\*\* | -0.08\*\*\* | -0.07\*\*\* | 0 | 0 |
| (0.01) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (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 | -0.04\*\*\* | -0.04\*\*\* | 0 | -0.01 | -0.02 |
| (0.02) | (0.02) | (0.01) | (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\*\*\* | -0.06\*\*\* | -0.05\*\*\* | -0.05\*\*\* | -0.02 | -0.01 | 0 |
| (0.02) | (0.02) | (0.01) | (0.01) | (0.02) | (0.02) | (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\*\*\* | -0.04\*\*\* | -0.04\*\*\* | -0.04\*\*\* | -0.04\*\* | -0.03\*\* | 0 |
| (0.02) | (0.02) | (0.01) | (0.01) | (0.02) | (0.02) | (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\* | -0.03\*\* |
| (0.01) | (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 Allocation | -0.01 | -0.01 |
| (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 Supervision | -0.04\*\*\* | -0.02\*\* |
| (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 Choice | 0 | -0.01 |
| (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 Allocation | -0.01 | -0.01 |
| (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 Supervision | 0 | -0.01 |
| (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).

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. [↑](#footnote-ref-1)
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). [↑](#footnote-ref-2)